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2A BESSEMER STREET
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(02) 9672 8899

EDITORIAL

EDITOR Travis Annabel

JOURNALIST Cahn Turner

EDITORIAL CONTRIBUTORS Andrew Leimroth, Brendan Seymour, Allen Hodges, Linda Bloffwitch, Katie Houghton

PHOTOGRAPHY Rob Cameriere, David Wolschenko, Wes Whitworth, Linda Bloffwitch, Katie Houghton

EDITORIAL ENQUIRIES Email: editorial@overlander.com.au

DESIGN

GROUP CREATIVE DIRECTOR Sam Livolsi

CREATIVE DIRECTOR LEISURE & MOTORING

Igor Amedov

ART DIRECTOR Ryan Weeks

DESIGNER Scott Osborne

DIGITAL

DIGITAL PUBLISHER Shaun Whale

WEB MANAGER Gerwood Stewart

DIGITAL MANAGER Justin Morellini

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PRODUCTION

PRODUCTION MANAGER Bronwyn Rowe

PRODUCTION CO-ORDINATORS Alexandra Grosvenor

ADVERTISING

DIRECTOR OF MARKETING Glenn Wright

NATIONAL ADVERTISING SALES MANAGER / LEISURE DIVISION

Mark Wilde

Ph: 02 8719 3658

Fax: 02 9648-7293

Mobile: 0467 307 509

Email: mwilde@expresspublications.com.au

NATIONAL ADVERTISING SALES MANAGER/LEISURE DIVISION

Judie Groves

Ph: 03 9438 3555

Fax: 02 9648 7293

Mobile: 0438 316 185

jgroves@expresspublications.com.au

ADVERTISING SALES MANAGER

Daniel Groves

Ph: 03 9438 3555

Mobile: 0433 297 460

dgroves@expresspublications.com.au

ADVERTISING ENQUIRIES

Ph: 02 9741 3883

ADVERTISING PRODUCTION COORDINATOR

Shantelle Isaacs

Ph: 02 9741 3833

Email: sisaaks@expresspublications.com.au

RETAIL SALES

Distribution enquiries – Circulation Department

Email: circulation@emgroup.com.au

Phone: 02 8719 3503

SUBSCRIPTIONS

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Email: subs@magstore.com.au

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POWER UP!

If there's one thing we can never have enough of when it comes to our 4WDs, it's power. Whether you're on a big lap towing a 3 tonne van, or you're running a big 4WD with large tyres so you can tackle those ultra-tough tracks on the weekend, a more powerful 4WD is a definite advantage. For tourers, it's generally about having more pulling power to tow the boat, caravan or camper trailer - let's face it, no-one likes limping up a big hill on a freeway in second gear while full-loaded B-doubles roar past you. For hardcore 4WDers, it's about having the power-on-demand you need to tackle big bog holes or soft sand.

If I had to point to my favourite mod that I've done to my Prado, it'd be installing a performance exhaust and extractors. Being a V6 petrol 4WD, it immediately gave me loads more power, better fuel economy and an awesome exhaust note. I'm not kidding about the power either, it really surprised me how much it boosted the old 5VZ engine. I now use my Prado as both my tourer and hardcore wheeler (yes, a Prado as a hardcore wheeler - stop looking at me funny). I recently sold my second 4WD, a 2006 HiLux which had been my family touring rig - a story for another day, but sufficed to say it was hardly cost effective maintaining two considerably modified 4WDs. Back to the Prado - It had always been the plan that the Prado would be a bit of a "budget 4WD", in that I'd save costs wherever possible, do all the work myself etc. One of the things that I was never too fussed about was the power - or lack thereof - that the 3.4L

V6 had. So when I got the opportunity to install a performance exhaust and extractors for a pretty sensational price, I couldn't say no, but at the same time I wasn't too fussed. It turned out to be the best decision I've ever made regarding modifying a 4WD, and as I said, it has become my favourite modification.

The thing is, boosting your 4WDs power is something that is continually useful - you get to experience the advantage of it every moment you're behind the wheel, whether you're commuting to and from work, halfway across the Simpson, or tackling tough muddy tracks on the weekend. While you may have convinced yourself that you're happy just chugging away in your old no-turbo diesel, you'd be surprised how much boosting your power enhances your driving experience, both on and off-road.

The trick is to make sure that your choice of power-boost doesn't come at the expense of a drop in reliability. This issue, we've taken a look at all the common ways to increase the power in both diesel and petrol 4WDs. Turbo's, superchargers, exhausts - the list goes on. This is your definitive guide to upping the ante in 4WD performance, so make sure you don't flick past it!

Cheers,



Travis Annabel
Editor



LETTERS

Have your say! Send your feedback or questions to editorial@overlander.com.au

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TEN YEARS ON, STILL GOING STRONG!

Dear Overlander,

Ten years ago I sent you a quick letter in to thank you for your advice in buying my Suzuki Vitara, which was published alongside a picture of myself aged 18 looking very happy with my Red Vitara wagon on Fraser island.

For a group of my friends, that was our first 4WD camping trip, something which proved to be the start of a long love affair with the outdoors, camping and great off-road tracks. Every year since that first photo was taken the highlight of our year was our group trip to Fraser Island, this year marking the 10th year.

A lot has changed in ten years, but the one constant has been my Red Vitara Wagon. Lifting the suspension

and adding air locking differentials has greatly improved its ability, while a dual battery system powers the fridge and the spot lights. I still get great enjoyment out of the looks on others faces when it tackles obstacles that have seen much meaner looking vehicles come to grief.

Shortly after this trip, the odometer in the car ticked over to 400,000kms, and while it has been thoroughly run in it's still my daily driver and never lets me down. So thanks again for the advice back in 2005, I look forward to writing you another letter about the car in ten years' time!

Cheers,
Phil Bugden

Hi Phil,

Mate, that's absolutely sensational! Great to hear you've gotten so much enjoyment out of the little Vit. I've been out on the tracks with people running the same model, and I'd have to agree with you - they are an undeniably under-rated 4WD. It's no surprise to me that you're showing other guys on the tracks up!

I also have to add, that you're making us all a little jealous that you visit Fraser Island annually!

Good on ya mate, can't wait to see how the Vit's going in a decade or so!

Cheers,
Trav

WINNER!



THE TECHNICAL SIDE OF TRAILER TYRES

Hello Team,

I need to replace the tyres on my trailer and I'm confused as to why folks would fit mud terrain type tyres to their trailer? As I understand, mud tyres are designed so that 4WDs have sufficient grip to power through mud holes. On an unpowered trailer are the tyres a waste of money? Are they more for a tough look, rather than function?

Thank you,
Anthony Mills

Gday Anthony,

You've posed an interesting question, and it actually got the team in the office talking – mud tyres are indeed designed to tackle deep mud, as well as dirt and snow. The lugs have greater spacing so that as the tyre spins, when mud is forced outward due to centrifugal force, the tread is automatically cleared of debris. This allows the un-clogged tyre to bite into the surface as it rotates. In trailer tyres, while the effect may not be as noticeable as on your 4WD, the same principle applies. As you move, the trailer tyres will clear mud from the tread and offer better grip.



Towing on a muddy or clay base, mud tyres on a trailer would track behind the 4WD much better than all terrains, slipping side to side much less as they bite into the surface. On muddy rutted tracks, mud tyres will also reduce the chance of your trailer slipping down into ruts and holes – avoiding potential damage or the need for a recovery. While you're replacing your wheels also remember it's a smart idea to try and match the tyres on your 4WD so they can act as spares in an emergency.

Cheers,
Cahn

FIRST TIMER

G'day Trav,

I finally dragged my partner camping the other week and after weeks of hearing how she was going to hate it – she ended up having a blast! Good news! She wasn't a fan of my swag though, so I've now almost convinced her we should get a camper trailer. I think it'll make things easier when we want to set off for a weekend, or hopefully week, from time to time. But my wife seems to think a trailer will make things more difficult with more to pack and unpack every trip. It's a big decision and wanted to hear your thoughts?

Thanks,
Ben Amos, via Facebook

Hi Ben,

It's always fun to introduce people to camping, and getting your missus keen on touring is sensational! The beauty of a camper trailer over a swag or a roof top tent is that all of your gear has a place. All of your cooking gear is stored in the camper's kitchen meaning you don't have to rifle through the rear drawers on your 4WD and all of the bedding can be folded up with the tent rather than having to pack up pillows and sleeping bags every time you arrive or depart a campsite – and they're just a couple of the benefits.

That being said, a roof top tent certainly has its advantages. They're quick to setup, and really comfortable. The trick is to find the right setup that



works for you. I've camped in all of the above - swags, RTTs and trailers. I've found that when I'm on my own, the swag is the way to go. When I have my missus with me, then the RTT works well, and when the whole family is along, you can't go past a camper trailer. It's horses for courses really!

On ya mate, hope to see you out on the tracks sometime!

Trav

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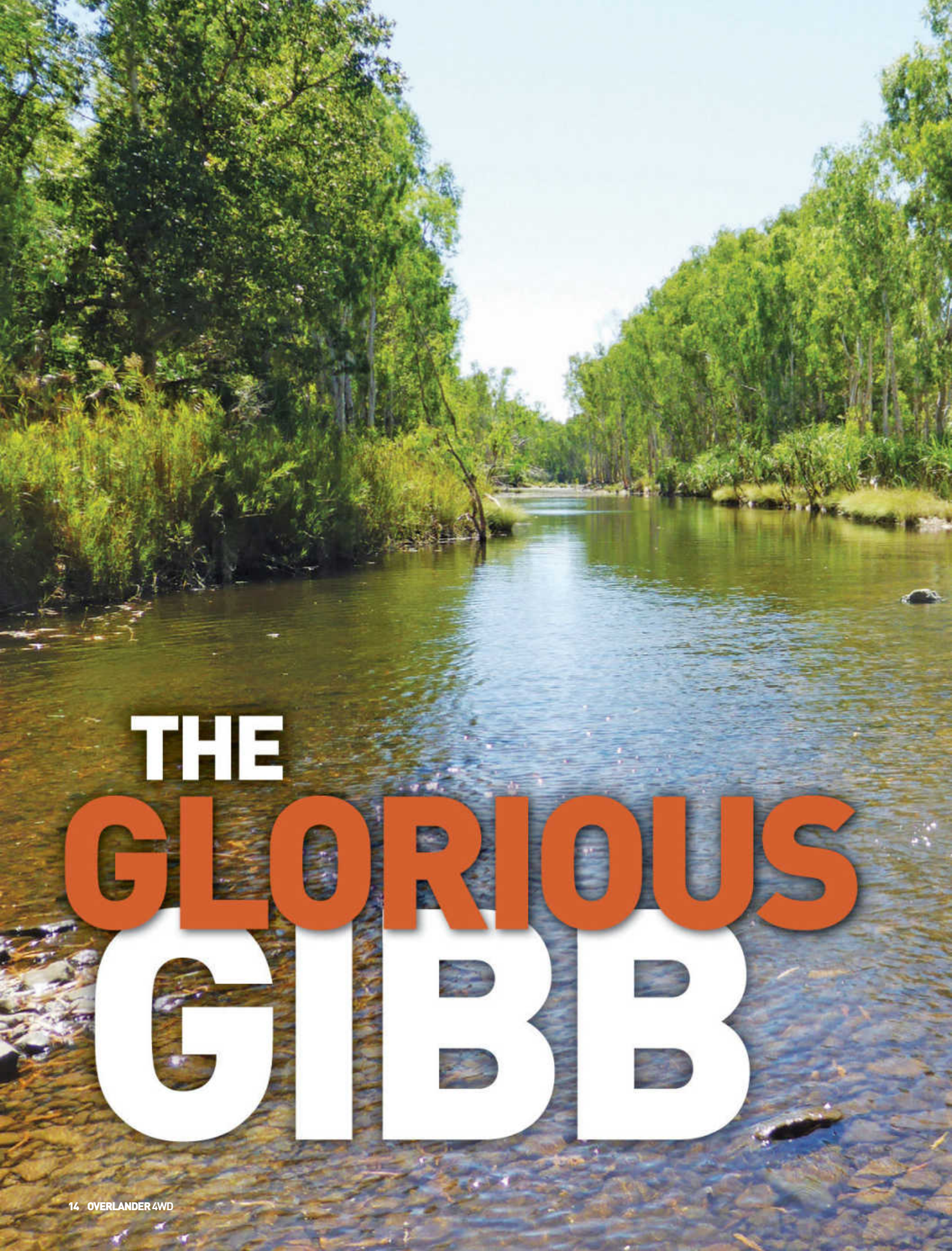
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WORDS AND PHOTOGRAPHY BY LINDA BLOFFWITCH



FACT FILE

WHERE:

Derby and the Gibb River Road are located in Western Australia's Kimberley region. Access to Derby is via the Derby Highway when travelling from Broome and the Gibb River Road turnoff is located 7km south of Derby.

INFORMATION:

The region offers spectacular scenery, excellent fishing, 4WDing, canoeing, swimming, bushwalking, plenty of attractions, and amazing camping locations.

FUEL & SUPPLIES:

Fuel and supplies are readily available from Derby. Along the Gibb River Road, fuel and basic supplies are available at Mt Barnett Roadhouse, Drysdale Station, and El Questro (ELQ also has LPG gas refill facilities). Tyre repairs are also available at Over the Range Tyres, Drysdale Station, Ellenbrae, Home Valley & El Questro Stations. Note: Imintji Store which offered diesel and supplies has recently closed so ensure you make other preparations until further notice.

WHAT TO TAKE:

Derby has many services so you should re-stock here before venturing onto the Gibb River Road. If you need any items to be ordered in, it could take several days. Be self-sufficient when travelling the Gibb River Road. Take recovery gear, air compressor, basic spare parts and a repair kit.

When you think Kimberley, most people automatically think of the Gibb River

Road. And there is a very good reason for this! This iconic destination should be added to every tourer's must see list because it pretty well has everything. With spectacular scenery, jaw dropping gorges and waterfalls, the region is also a playground for 4WDers and camping enthusiasts. To start our Gibb River Road adventure, we chose to do it from west to east and begin from Derby.

We only planned an overnight stay in Derby as we were looking to maximise our time on the "Gibb". We restocked our supplies, settled in at the caravan park, then headed out for the rest of the day. Derby's history dates back to the early 1880s when interestingly, the region was viewed as two areas and known as the Kimberlies. The "western" Kimberley stations were occupied by sheep pastoralists whereas the "eastern" Kimberley was renowned for its beef. In later years the sheep were replaced by beef and today the area is simply referred to as the Kimberley.

Whilst in Derby, we took time to visit the historic prison boab tree. The small space within this tree was used to hold up to 30 prisoners over a century ago before they were taken to Derby gaol in Loch Street. Not far away is the enormous Myall's Bore. When cattle were brought to Derby's port during the early 1900s to be shipped, the bore's 120 metre length enabled up to 500 head of cattle to be watered at any one time before the walk into Derby. Later in the day we opted to spend sunset down at the town's jetty where you can experience the magnificent flaming red sunsets, but arrive at the jetty early as there can be loads of locals and visitors!

Excitement was in the air the following morning as we packed up, refuelled and headed to the "Gibb". Even after travelling to the Kimberley for 20+ years, it still gives us a buzz when hitting the dirt. The Gibb itself is only 660km and if you were to travel this old stock route from one end to the other, you could easily do it in a couple of days. But it's the attractions off the Gibb which are the biggest visitor drawcards. If you have the time, there are more than 20 spectacular gorges waiting to be explored along this iconic





YOU'RE SPOILT FOR CHOICE WITH MORE THAN 20 SPECTACULAR GORGES ALONG THE GIBB WAITING TO BE EXPLORED

stretch of road. You'd be hard pressed to find those types of stats anywhere else in Australia.

Around the first 110kms is single lane tarmac so no need to air down tyres just yet. After reaching the dirt and dropping our tyre pressures, we took the turnoff for Windjana Gorge and Tunnel Creek. Choosing to camp in the non-generator section of the Windjana Gorge campground, it was already getting hot, but we set up in no time with the Tvan.

It was late morning and from past experience we knew Windjana Gorge is best seen early in the morning or later in the day. We took the opportunity to visit the old ruins of Lillimooloor located 3kms from the campground. Not a lot today remains if you visit the old homestead, but allow an hour to walk around the ruins and to read the storyboards about the area's past.

Later in the day we walked into Windjana Gorge from the campground. When you first lay eyes on the gorge,

it's hard not to feel dwarfed by its towering walls which are up to 100 metres in places. Taking a walk into the gorge, the kids will love seeing all of the freshwater crocs as Windjana is one of the best places in the Kimberley to see them in their natural habitat. Just don't get too close!

Another attraction to add to your must-see list has got to be Tunnel Creek. Each time we come to the Kimberley, I love visiting here. It's 35kms from Windjana Gorge and



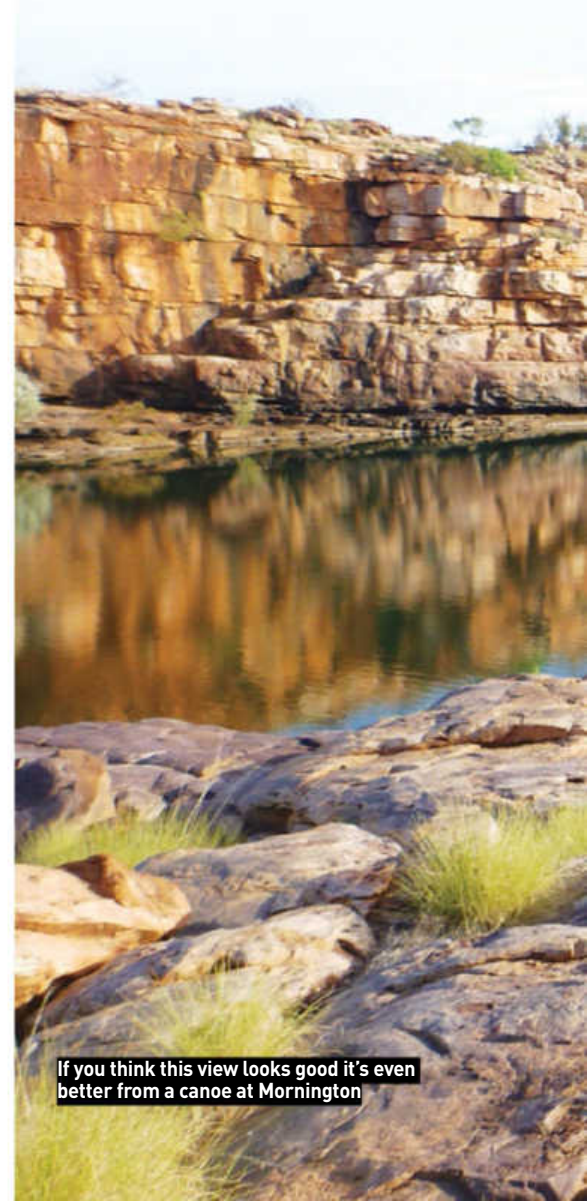


walking (mostly wading) through this unique 750m long tunnel is loads of fun for the entire family. You will need a good bright torch (or two) and wear shoes that can get wet as the water in the tunnel can be anywhere from ankle deep to waist height, and is home to the odd freshwater croc. Also shine your torch around the tunnel to spot Australia's only carnivorous bat.



The Gibb River Road has numerous stations and stunning attractions, so you are very spoilt for choice. This visit we stopped at Bell Gorge which is another favourite as the waterfalls flow late into the dry season making it an excellent place for swimming. The gorge campground is located at Silent Grove (10kms from the falls) and has good facilities with showers and toilets available.

We continued our adventure to Mornington Wildlife Sanctuary which is located 88kms off the Gibb River



If you think this view looks good it's even better from a canoe at Mornington

Road. It is one of the longer drives to visit attractions, but well worth it. There is an excellent range of activities here including swimming, bushwalking, guided tours and a couple of spectacular gorges which are best experienced by canoe. We hired one of the sanctuary's canoes and paddled our way through both Dimond and Sir John Gorge. This is an activity everyone will love! Here's a tip – book the canoe upon your arrival at the sanctuary as they book out quickly during peak times.

Further along the Gibb is where you find Galvans Gorge. This gorge would have to be one of the easiest to access around here and has towering high cliffs and a cascading waterfall. It's definitely a tropical oasis and another magical place to cool off. Walk to the far side of the gorge to see a small amount of aboriginal art when you visit.

We took the opportunity to refuel

at Mt Barnett Roadhouse and also paid for access to Manning Gorge and the campground for a night. With backpacks on, plenty of water and some snacks, we walked to the gorge first thing the next morning when it was cooler as it's a 3km walk to the gorge in full sun. Adding some fun to the gorge walk is the need to cross Manning Creek located only a short distance from the campground. A flat bottom boat to ferry your gear across the 50m wide creek is provided and is fun for kids of all ages.

Our last stop on our best of the west Kimberley visit was Mt Elizabeth Station. Having a good sized campground, attractions here include two gorges, Warla and Wunnamurra. Whilst the drive to Warla is not difficult, the drive to Wunnamurra is slow going with 4WD low required in places. Having a 4WD with high clearance is recommended. We made a

BEST TIME TO TRAVEL:

Derby can be visited all year around whereas the Gibb River Road is closed during wet season rains. Sections of the Gibb can begin to open at different times, so if any doubt, check the road conditions with the Derby Visitor Centre.

TRIP STANDARD:


Once you reach the Gibb River Road dirt, air down your tyres. The road is generally in good condition with some corrugations and is E-grade, suitable for off road camper trailers. The Fairfield Leopold Road (where Windjana Gorge and Tunnel Creek are located) can be heavily corrugated. When visiting the Gibb River Road stations, their side tracks could be D-grade as they vary - water crossings and some rough patches can be encountered.

THINGS TO DO: DERBY

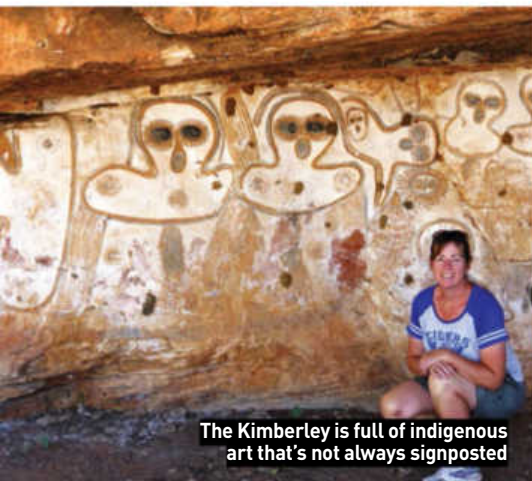
Fish and chips on the jetty, Wharfinger's Museum, Prison Boab Tree, Boab Festival (July), Horizontal Falls tour (cheaper from Derby than Broome).

GIBB RIVER ROAD

Swimming, bushwalking, aboriginal art, canoeing, 4WDing, photography, fishing, and a range of tours.



**THE KIDS ARE GOING TO
LOVE SPOTTING ALL THE
FRESHWATER CROCS AT
WINDJANA GORGE**



The Kimberley is full of indigenous art that's not always signposted



RESTRICTIONS AND PERMITS:

Along the Gibb River Road, you will require a vehicle access permit and camping permit for the National Parks at Windjana Gorge, Bells Gorge, and if travelling to Mitchell Falls, at Munurru and Mitchell River. These can be organised at the individual parks or for a cheaper option purchase a four week pass from the National Parks office in Broome and Kununurra.

CAMPSITES:

Derby has a couple of caravan parks which are busy during the main tourist season so book in advance if possible. Camping options along the Gibb River Road are plentiful at the various stations (payable) and free camping is also available.

KEY CONTACTS:

Derby Visitor Centre
PH: 1800 621 426

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DON'T MISS PART 3!

Next issue, Linda's hitting the eastern stretch of the Gibb including the spectacular Mitchell Falls!

day of our visit to Wunnamurra as the gorge is spectacular and you can see loads of Wandjina style aboriginal art if you go exploring down the gorge.

If you are a 4WDer seeking a challenging track, Mt Elizabeth Station is where you access the rugged and remote Munja Track. This 260km track which takes you to Walcott Inlett isn't for the first time 4WDer and won't suit all styles of camper trailers. You need a high clearance 4WD, vehicle recovery gear, and must be self-sufficient. You'll need very deep pockets if your vehicle

needs to be recovered from here! The track is an amazing experience, but it's not something you want to rush - allow at least 7 days.

So this brings our Derby and western Gibb River Road adventure to an end. We've been 4WDing, swimming, bushwalking, canoeing, taken stacks of photos, camped under a million stars and seen some of the best natural attractions the region has to offer. We know the eastern section of the Gibb is going to be just as good as the west, so let's get cracking! ■

**THE KIMBERLEY SHOULD BE
ON EVERY TOURER'S MUST
SEE LIST BECAUSE IT PRETTY
MUCH HAS EVERYTHING**



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POWER TO THE PEOPLE

Looking to boost the performance of your 4WD?
Here's everything you need to know whether
you run a petrol or diesel 4WD!

COMPILED BY OVERLANDER 4WD



Envoy is a terrible thing. There you are, convincing yourself that your old diesel has enough power for the run up the freeway, even if you do have to knock it back to second for the climb up the range. Then all of a sudden someone with a near-identical 4WD comes flying up beside you, overtakes and before you can process what's happened, he's outta there, sitting in top gear at the speed limit the entire way up. All of a sudden you're cursing your pride and joy, as you watch

the speedo and tacho needles drop, and contemplate the shift back to first...

Yep, we've all been there. 4WDs and slow go hand in hand - or at least, they used to. Time was, that you just accepted that your truck didn't have the legs out on the longer stretches, which was okay because it had plenty of power in the bush where it was needed. These days, however, you no longer need to live life in the slow lane, being passed by loaded B-Doubles. It's all about power!

That fella that blew your doors off up

the hill understands that it's all about talking to the right people when it comes to making extra power. Anyone can turn the fuel up in a truck and belch out black smoke, but smart thinking takes a holistic approach to engine power production, ensuring that every aspect of an engine's power production is covered. Some engines are easier and cheaper to get power from than others, but there isn't a motor out there in a 4WD on the tracks somewhere today that wouldn't benefit from a bit of expert tweaking.



UNDERSTANDING YOUR ENGINE

The key to more engine power is knowledge

Most of us know that the biggest difference between a petrol and diesel engine is in how they ignite fuel. Let's have a think about the fundamentals of a four-stroke engine. It starts with an intake stroke where the air is drawn in, combined with fuel and ignited. The resulting explosive energy is converted into rotational force, or torque, via the pistons and crankshaft, which is then transmitted through the drivetrain and on to your wheels.

The suck is when the piston starts at top dead centre (TDC) and travels down its throw, with the fuel and air

uses the high rate of compression to heat the air that's been drawn in on the intake stroke. This is then mixed with a fine mist of diesel, which reacts with the heated, compressed air and ignites. Because it's relying on immense compression to ignite the fuel, the diesel engine can handle using a heavier/cruiser grade of fuel. A spark plug simply wouldn't have the power to ignite the fuel.

The important thing to know about any engine is all you can do to make an engine more powerful is to make it more efficient. Manufacturers are generally on the ball

THERE'S A LOT OF WRIGGLE ROOM TO SQUEEZE MORE POWER OUT OF YOUR 4WD

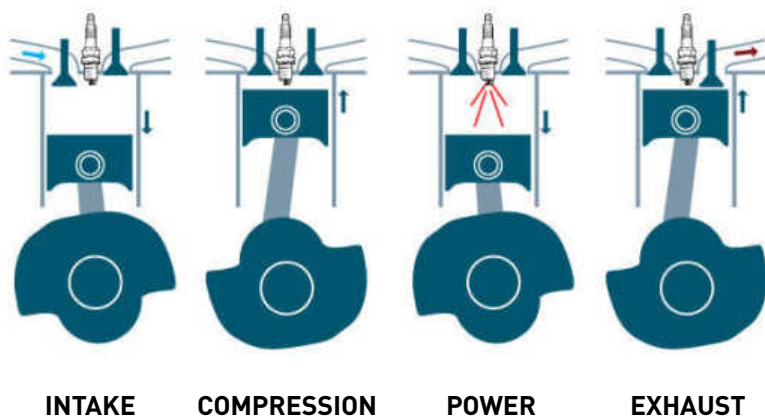
drawn into the cylinder at this time (the intake stroke). The squeeze refers to the compression stroke, where the piston travels back up towards TDC, compressing the air/fuel mixture.

With a petrol engine, the spark plug is timed to deliver a spark at a certain point in relation to the piston's position. This ignites the air/fuel mixture, resulting in the power stroke which forces the piston back down along its travel, and back up again, pushing the exhaust gas out and readying the cylinder for another cycle.

The diesel engine, on the other hand,

with most modern engines but due to cost, noise and pollution restrictions there's still a lot of wriggle room to squeeze more power out of your 4WD.

Air flow is the biggest area for improvement. The easier it is for air to move in and out of an engine the less power is lost trying to force it through restrictive exhausts or suck it in through inlet manifolds. Think of it like trying to run while you're breathing in and out through a straw, you might be able to do it but you'll work a heck of a lot better with a larger straw.



An upgraded radiator and quality coolant will ensure your cooling system is working to its potential. If a car runs too hot or cold, it can't possibly be efficient, cooling systems are responsible for more than just pumping coolant after all

COMPRESSION AND AIR DENSITY

We mentioned earlier about getting more power through making the engine more efficient. One of the ways the manufacturers can tweak this is through compression ratios. The idea is the more compressed the air/fuel mixture is, the more energy that's packed into each explosion when it's ignited.

The downside to increased compression is engine pre-igniting (or detonation), where the mixture ignites too early causing massive pressure in the cylinder at the wrong part of the stroke and potentially catastrophic damage.

Just like compression, air density can play a massive part in just how much power your engine can put out. There's a few ways to make air denser, but the general rule of thumb is the colder the air, the denser it is.

There's entire textbooks written on air density but the long and the short of it is, the denser the air is, the more oxygen molecules, and the more fuel you can add into the mix – the bigger the bang. This is the basis of both turbochargers and superchargers.



FUEL & ENGINE TIMING

The moment of ignition in both a petrol and diesel engine is one of the most important factors for performance and fuel economy. The air/fuel mixture doesn't burn instantly. By having the mixture finish burning right after the piston reaches the bottom of its power stroke you're able to ensure the most efficiency out of your engine.

Having the timing too advanced can cause the explosion to push against the piston while it is still on its way up causing detonation. Too far retarded can lead to lost power and poor fuel consumption as the exhaust valve begins to open before the air/fuel mixture is completely burned.

Fuel, whether it be petrol or diesel, also needs to be monitored closely. Petrol is graded in an octane rating, generally

91 through to 99 RON.

For petrol engines, the higher the rating the less likely it is to pre-ignite before the spark plug actually fires. Pre-ignition places massive internal stresses on components like the crankshaft, timing gear and valvetrain, as the burn begins while the piston is still on its upwards compression stroke.

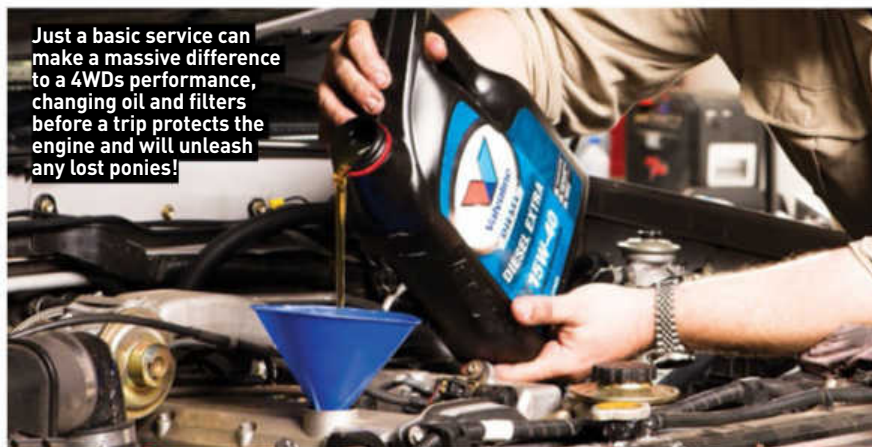
Diesel is rated in much the same method with a Cetane number. Unlike petrol, the rating system with diesel refers to just how easily it will ignite. The higher the number, the cleaner the burn and the more power under your right foot. Advancing timing is one of the easiest ways to make your engine run to its full potential, but if the fuel isn't up to the task it'll only end in expensive repair bills.

POWER VS TORQUE

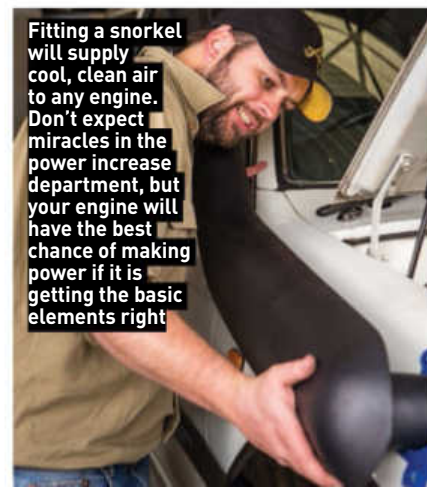
Torque is an engine's ability to do a lot of work. While power is the speed that it can do it. If you need momentum power is where it's at. But if you need to tow, or do a lot of low-range driving torque is the recipe to success.

Diesels generally produce more torque than a petrol of the same capacity. Diesel burns slower in the combustion chamber than petrol does, therefore it burns for a longer period of time. To harness that longer burn, diesel engines have longer piston strokes than petrol engines.

The stroke refers to the difference in piston position between top dead centre and bottom dead centre. For every ignition stroke of the engine, the energy created by the burning fuel is able to be applied to the engine's crankshaft for a longer period of time. This is a major contributor to any engine's ability to create torque.



Just a basic service can make a massive difference to a 4WD's performance, changing oil and filters before a trip protects the engine and will unleash any lost ponies!



Fitting a snorkel will supply cool, clean air to any engine. Don't expect miracles in the power increase department, but your engine will have the best chance of making power if it is getting the basic elements right

TURBOCHARGING

Everything you need to know about turbocharging your 4WD

Turbochargers work by using your engine's exhaust gasses to turn a turbine. This turbine then spins an impeller via a connecting shaft that condenses the air charge before directing it in to the engine's intake.

As the engine's inlet valves open, the pressured intake air is forced in to the combustion chamber, allowing more fuel to be injected, which increases the power of every stroke. To get the solid facts on everything turbo-charged we spoke to Tony Martin from MTQ Engine Systems. He's lived and breathed turbochargers so he knows just how to get the most out of your engine, and do it reliably.

As one of a few methods of forced induction, turbocharging is the most thermally efficient, which is the percentage of the air-fuel ratio that is converted into power. They increase volumetric efficiency (a fancy way of saying cramming more air into the same space) which allows gains to be made in both horsepower and torque.

With diesels, turbos can raise inlet and exhaust temperatures, and if too much

boost is run without adequate cooling, cylinder heads and pistons are common casualties. On petrol motors, turbos can cause detonation if they're wound too high which will melt pistons and burn valves if left unchecked.

The other big pitfall with turbos is that if they're set up incorrectly or not matched with the right engine, they can cause what's commonly referred to as turbo lag. Turbo lag is not such an issue with diesels given their higher exhaust production levels, however petrol engines can suffer. This is exacerbated by the fact that engines that have a turbo attached are usually running lower compression than a naturally aspirated job, further reducing power. When it comes to turbochargers there's a lot more to be done than just bolting on a manifold and calling it done. The easiest step is mounting and lubricating the turbo itself. A T-piece out of the factory oil pressure sender for an oil feed and a fitting drilled and tapped into the sump for a return line are easy to fit.

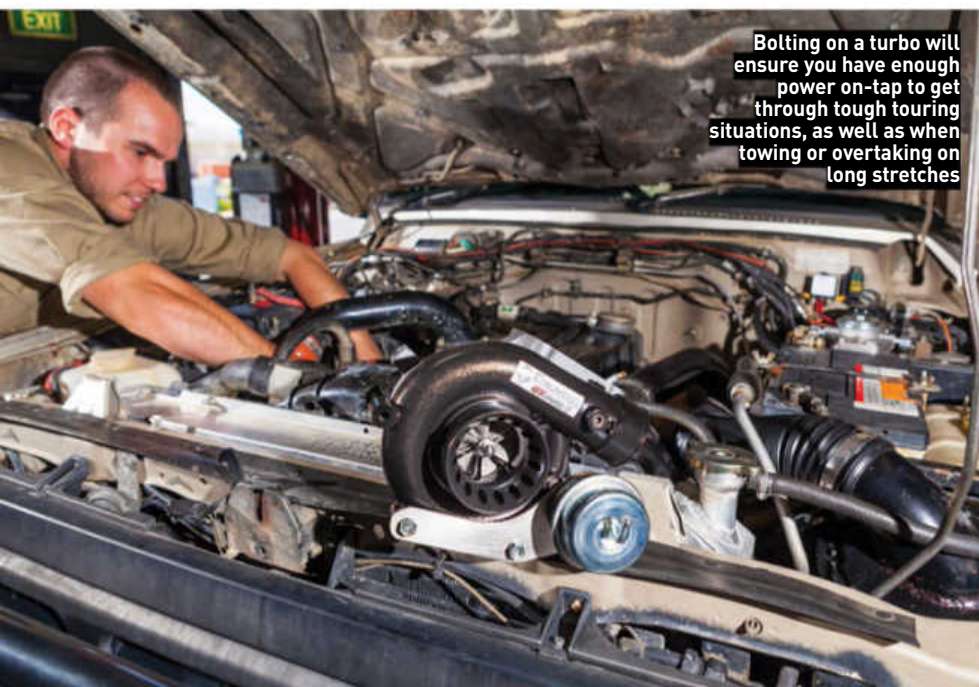
If your engine is electronically controlled an ECU upgrade is an absolute



Choosing the right turbo for your vehicle is critical! Too big and it won't spool up enough in time to make useable power, too small and it will run out of puff before making peak power

must as well. The ECU has a series of sensors that let it know exactly what is happening with your engine and it controls fuel and spark accordingly, when you fit a turbocharger the ECU simply doesn't know what to do with the new information. Most factory ECUs aren't able to be tuned to suit the new conditions so a piggy back chip or a standalone ECU are an absolute must to get the most out of your engine.

Another common area people overlook is compression. As a rule an engine should have as much compression as possible without inducing knock, or detonation. When you introduce a positive charge from a turbocharger into the engine knock becomes a risk. Your options to fight it are to run higher quality fuel, run lower than normal boost, or reduce compression through either lower compression pistons or a spacer between the head and block.



Bolting on a turbo will ensure you have enough power on-tap to get through tough touring situations, as well as when towing or overtaking on long stretches

WASTEGATES

"An external wastegate does the same job as an internal wastegate," Tony explains. "Both bypass exhaust gas from the turbo to the exhaust to control the speed of the turbo and control the boost level. The external wastegate is normally used when you have too much exhaust gas flow to control boost and a larger wastegate is required."

POWER GAINS

Power gains of up to 50% are common with turbo installs to a naturally aspirated engine. Turbos provide progressively more boost (and therefore power) as engine revs rise, however, they won't start making power until the turbine is up to speed and began to generate boost. The time between when you put your foot down and when the turbo comes on to boost is referred to as turbo lag.

Different-sized turbos reach maximum boost (and therefore power) at different revs, so it's important to match the A/R ratio of your chosen turbo to your engine and driving style. When it comes to 4WDing, you want power to come on as early as possible.

A/R RATIO - THE KEY TO USEABLE POWER

Similar to diff gearing and tyre sizing, the size of the exhaust and compressor housing and turbines have a direct link to how fast the turbo generates boost, and within what rev range.

"The A/R ratio is a measurement of the cross section of the port in the turbo," Tony says. "This normally works in relation to the frame size of the turbo. The smaller air ratio the faster the turbo spools up the larger the air ratio the slower the turbo spools up.

"When sizing a turbocharger you need to determine what you're doing with the vehicle and where you want it to perform. If you have the same capacity engine, one with a small turbo and one with a larger turbo both running the



temperatures increase.

The engine with the larger turbo will make more power higher in the RPM as the larger turbo has more airflow for the same boost level. As a trade off it will not make boost until higher in the rev range.

Running a twin turbo setup can get

side is a twin turbo setup takes up a lot of room in the engine bay, is quite costly to install and requires precise calculation to work out the optimum turbo sizing. Get the turbo sizing wrong and you're just wasting money."

GET THE TURBO SIZING WRONG AND YOU'RE JUST WASTING MONEY

same boost, the one with the small turbo will perform better down low but will run out higher in the RPM. The smaller compressor wheel cannot make the correct amount of airflow higher in the rev range and in trying to, the air intake

around some of these issues. "The idea behind running two turbos is run one small and one large turbo in series," he says. "The small turbo comes on low down in the rev range and helps to get the larger turbo up to speed. The down

STANDARD VS HIGH-FLOW VS BALL BEARING

"Ball bearing turbochargers spool up slightly faster than brass bushed turbos due to the bearing design," Tony explains. "Quality ball bearing turbos offer an increased thrust load over brass bushed turbochargers. In saying that, brass bushed turbochargers are much easier and cost-effective to high-flow. Once the turbocharger is on boost there is no difference in performance in the vehicle."

GET WHAT YOU PAY FOR

Fitting a quality turbocharger will ensure you're fitting reliable parts to your engine," Tony from MTQ Engine Systems explains. "Some cheap turbochargers are made of inferior materials and are not tested to the same specifications and made to the same tolerances as the genuine product. OEM turbo manufacturers like Mitsubishi, Holset, IHI, and Garrett, spend big dollars on research and development. OEM manufacturers also test their product to destruction to ensure that their units are burst contained. When money is tight a cheaper option may appear attractive, but you have to weigh up the long-term risk. Just think, turbochargers often spin at 10,000rpm, so imagine the engine damage, or worse, person injury that could occur should something let go."



SUPERCHARGERS

After low-down grunt? A supercharger could be the answer

Originally used in industrial applications, superchargers come in two distinct types, positive displacement and dynamic. Positive displacement superchargers are belt driven and can provide your engine with more power, more throttle response and when driven correctly, more economy too. Positive displacement chargers are commonly seen in twin screw form. Twin screws operate by meshing screws, similar to worm gears that draw the air in and compress it before sending it on to the engine. Positive displacement units generally deliver lower boost although it's constant across the rev range, meaning the power is there the instant the throttle is cracked.

Dynamic superchargers are also belt driven and still provide a method for forced induction; however they are a little different in their operation to a positive displacement blower. The most common dynamic blower is referred to as a centrifugal supercharger. It is essentially the same as a turbo only instead of the compressor impeller being

driven by exhaust gasses, it's belt driven. Alan Hale from Harrop Engineering came on board to smash some of the myths surrounding superchargers.

Positive displacement superchargers deliver power down low, right where it's needed. Similarly, dynamic blowers can be used with great effectiveness when strapped to an engine that develops its power higher up in the rev range. The big downside to any forced induction setup, though, is heat. Compressing air raises its temperature significantly and if high boost applications do not offer some sort of pre-intake air cooling (such as an intercooler) then detonation and high EGTs can occur.

Superchargers take up a lot of room and due to the necessity of fitting a larger crank pulley means various engine components may have to be relocated. Once you have it all sorted though, the massive increase in torque and horsepower right from idle will make it all worthwhile.

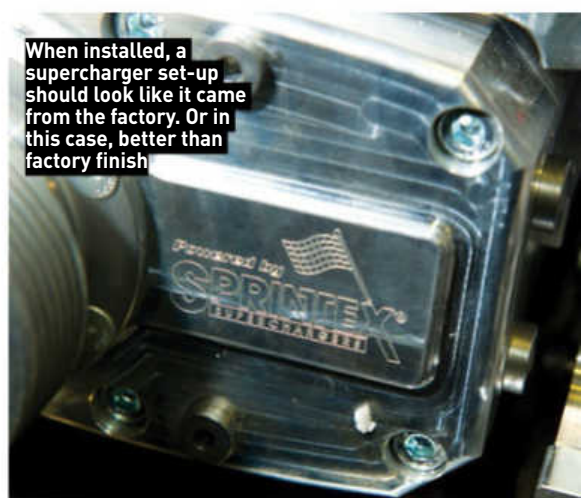
Superchargers aren't just for petrols, considering the low-down torque properties of diesels, bolting on a supercharger that makes boost near idle makes plenty of sense



If you didn't know what makes up a supercharger kit, you do now! Note the new sparkplugs and belts, fitting a blower is much more involved than just getting air into the engine, it's the little things that all add up



When installed, a supercharger set-up should look like it came from the factory. Or in this case, better than factory finish



POWER GAINS TO EXPECT

Power gains will largely depend on the original motor, the ability to tune, and where in the rev range it makes its power. "It is not uncommon to see 35-40% power gains with a moderate boost," Alan explains. "On an engine that produces its optimum torque mid-way through the rev range, a positive displacement blower would be the go, as the boost is available right down low."

"For a free revving four or six cylinder that makes the majority of its power up high, a dynamic charger will probably suit it more as the peak power delivery is consistent with the onset of boost."

"At the end of the day, the positive displacement supercharger best suits 4WDers who crave power down low. However if most of your driving is high speed touring and you're looking for more overtaking power, then a centrifugal blower would be the way to go."



IT'LL DRIVE LIKE IT'S GOT AN EXTRA COUPLE OF CYLINDERS UNDER THE BONNET

THINGS YOU NEED TO KNOW

The nature of superchargers is that they require belt drive from the crank pulley in order to work. This can mean rerouting or relocating engine auxiliaries in order to clear a path for the new belt. "The additional thickness of the crank pulley may also cause clearance issues with the bottom of the radiator fan shroud," Alan says. "The type of supercharger you fit may also be determined by the location of the drive belt, so it's best to have this sorted early in the build."

"While you'll achieve better results by fitting a free-flowing exhaust system, you don't have to upgrade the exhaust in order to get it running and see noticeable results."

Just like a turbocharger, superchargers

are incredibly easy to tune, if you know what you're doing. Like with any forced induction setup engine knock is always the concern, because of this consideration must be paid to timing and fuel quality. If timing is advanced to get maximum power and run on high octane petrol, or high cetane diesel, engine knock can become a serious issue when travelling to remote locations and using lower quality fuels. Because of this tuning should always be done with mind to the type of driving you'll be doing. If you're only ever doing local tough-tracks wind timing forward and get maximum performance. If you're heading to the outback for months at a time a more moderate tune would suit you best.

That comes down to a variety of factors. Turbochargers and superchargers both have their pros and cons. It ultimately comes down to what sort of power you want under your right foot. The ability to deliver low-down grunt on demand makes the supercharger tick a lot of boxes, although with a diesels ability to spool up a turbo from near on idle it isn't a massive issue compared to petrols. If you're after the high end rush of a turbocharger a centrifugal supercharger might be up your alley, or if you want your 4WD to drive like it's got an extra couple of cylinders under the bonnet, rather than a forced induction setup, a positive displacement supercharger could be the perfect fit for your 4WD.

INTERCOOLERS

Lower intake temps will help retrieve lost power!

An inherent by-product of forced induction is an increase in air temperature. The hotter air gets the less dense it becomes and efficiency can be lost. This is why intercoolers are necessary when you start running higher boost levels.

Similarly to a radiator, air is passed through the intercooler which dissipates the excess heat either into the atmosphere or into a surrounding body of water (in the case of a water to air unit). Care has to be taken when choosing an intercooler as they can

heat up in slow-speed off-roading and actually become a heat sink, which can work against the engine. Fitting a quality unit with adequate flow properties for your 4WD is essential. But what options are available? We spoke to three of the leading guys in the industry, Marcus White from Great White Fabrication, Jon Bailey from Cross Country 4x4 and Alex Michalsky from Plazmaman to find out just what does and doesn't work, and where you should spend your hard earned.

INTERCOOLER TYPES

TOP MOUNT

With most turbocharged engine you'll have your intake on one side of the head with the turbocharger on the other. A top mount intercooler fits between the two, cooling the compressed air from the turbo on its way through to the inlet manifold. This means a short path for the charged air and improved throttle response. They're well protected from sticks and animal strikes although they do have their downsides.

An intercooler's job is to transfer heat from one source to the other, ideally they'll transfer heat from the hot

air inside into the cooler air outside, lowering intake temperatures in the process. With the intercooler mounted directly above the engine and turbo in low speed driving it can struggle to get cool air across the core, losing efficiency in the process due to the effect of heat soak. Although there are ways around this with a little clever thinking.

FRONT MOUNTS

Front mount intercoolers work much the same as a top mount, and can often be the same intercooler itself, just mounted differently. The benefits of a front mount are less heat soak from the engine bay and improved cooling of the intake



These days' intercoolers come in all shapes and sizes, making fitment in increasingly complicated engine bays much neater and more economical

WHY NOT INTERCOOL AN N/A ENGINE?

"As a naturally aspirated engine does not have a compressor such as a turbo or supercharger," Jon explains. "It's not necessary to cool intake air. The N/A engine breathes undisturbed atmospheric air and will only be marginally above ambient temp, if not the same temp. If anything, placing the intercooler near hot components, such as a front mount intercooler near the radiator, may in fact heat the air as it is affected by heat soak."

charge. The downside is though with the tougher piping needed to plumb the intercooler there can be a drop in throttle response. The core can also restrict air flow into the radiator and is left exposed to damage off-road if not protected by adequate barwork.

WATER TO AIR

Water to air intercoolers are starting to gain popularity with 4WDers for a number of reasons. They comprise of a barrel that fits between the turbo and inlet manifold. Much like a radiator the barrel works by transferring heat from the air inside to the coolant flowing through the intercooler. From here the coolant is pumped off to an external radiator. The main benefits of a water to air intercooler are the increased throttle response of a top mount intercooler with the cooling ability of a front mount. The external radiator can be mounted anywhere that sees reasonable air flow but with the aid of a 12V fan can be mounted in tight spots. The downsides of water to air intercoolers are the complicated systems needed to run them and the possibility of failure introducing coolant into your intake.



Aftermarket intercoolers are bigger, more efficient and constructed without compromise to get the most power out of your engine. Aftermarket intercoolers are bigger, more efficient and constructed without compromise to get the most power out of your engine.

WHEN SHOULD YOU INTERCOOL?

There's two main ways to build an intercooler, and they'll give very different results. "The majority of bar and plate intercoolers are mass produced in developing countries," Alex tells us. "There's very little R&D into them so they're very heavy and have issues with pressure drops and heat soak. Most manufacturers these days utilize tube and fin cores. They're ultra-light weight and have very few issues with heat soak and pressure drops."

At first glance the bigger the intercooler the more efficient it'll be, but that's not the case. "You can definitely go too large with an intercooler," says Marcus. "The larger the intercooler the more air it takes to properly fill it. It means you lose air-speed which affects

throttle response and brings on turbo lag. Two things no 4WDer wants. You need to reach a balance between big enough to sufficiently cool the compressed air, and small enough to avoid lag and poor throttle response."

There's a long list of modifications you can make, the important thing to know is when is the right time for each one. "I normally recommend people fit a chip and exhaust first," Marcus tells us. "With the gases flowing freely and the boost upped slightly an intercooler makes a perfect upgrade. The best part is most engines will cope with an upgraded intercooler without any extra modifications. They'll have the sensors in place to read the cooler air and adjust fuel to suit. The factory airbox can often

be restrictive as well so a snorkel or new airbox can help fix that. A 5-10% increase in power is quiet common but the real gains are in throttle response."

DO INTERCOOLERS WORK WITH SUPERCHARGERS?

"Supercharged engines definitely respond just as well to intercooling," Jon explains. "This is because compressing air generates heat, hot air is less dense than cool air. Therefore a cooler intake charge will be denser and allow for more fuel to be burnt. This ultimately improves power development, improves economy and reduces the running temperatures of the engine."

THE REAL GAINS ARE IN THROTTLE RESPONSE

Intercoolers need plenty of air to work effectively; installing a bonnet scoop will force air into the engine bay. Alternatively if you can't run a scoop, many people are having luck with small 12V electric fans positioned on top of the intercooler



EXHAUSTS

Give your 4WD an advantage by fitting an exhaust with bite!

The way your exhaust works is a little more complicated than it seems. When the piston travels upwards on the last stroke of its cycle, the spent exhaust gases are propelled out of the cylinder through the exhaust valves into the exhaust manifold.

As the exhaust gas travels along the pipe, it comes to the catalytic converter (or 'cat'), which filters some of the more harmful chemicals from the gas, preventing them from being released into the atmosphere. After passing through the cat, the gas travels on to the muffler. These quieten your exhaust noise and are commonly found towards the end of the system.

While the exhaust note sounds like one

constant growl, it actually flows in a series of pulses in tune with the exhaust valve opening and closing. The 'head' of the pulse has a higher pressure than the 'tail', which typically runs at such low pressure that they are very nearly a complete vacuum. It's this pressure difference that keeps each pulse moving as each one sucks the next one through. This is why the exhaust design is critical to achieving optimal performance for your 4WD.

Increasing pipe diameter to facilitate better flow characteristics of the gas is the most popular method of optimising exhaust performance, but there's a lot more to it than just bolting on a set of performance headers and the fattest pipe you can buy and calling it good.

HIGH-FLOW MUFFLERS

Mufflers are one of the simplest, yet most complicated parts on our 4WDs. If you cut one open you'll generally find a hollow box with a few tubes running through it. These tubes, and the spacing between them is finely tuned to cancel out as much noise as possible. They work by creating equal and opposite sound waves designed to cancel each other out. The downside to this is it creates massive back pressure slowing the flow of exhaust gases and restricting power output in the process. Much like a Catalytic convertor there are many aftermarket options available that can improve exhaust flow, although in most cases it's at the cost of noise reduction.

EXTRACTORS, MANIFOLDS & DUMP PIPE

Most factory exhaust manifolds are too small and create flow resistance, meaning the engine must work harder to expel the exhaust. On the flipside, manifolds that have too large a diameter will result in the gases expanding and losing velocity, decreasing the scavenging effect.

Choosing a tuned set of headers is possibly the most important part of deciding on your aftermarket exhaust," Brian Parker from Beaudesert Exhaust explains. "They are designed to provide performance increases at specific rev ranges. A decent set of headers on a revvy four-cylinder motor that's designed to make its power at higher revs will be very different in design to those found on a diesel engine that's making maximum torque at lower revs."



Mufflers are one of the simplest, yet most complicated parts on our 4WDs

"4WDs will benefit more from headers designed to produce torque down low, as that's where most of us do our driving, be it in low-range or towing a trailer across the Nullarbor. These types of extractors are generally longer with a smaller diameter than items designed to maximise horsepower at higher revs, which are shorter and wider."

It's important to note that there are few gains to be had from fitting an aftermarket exhaust manifold to your turbocharged vehicle. The factory manifolds, while not ideal, are generally pretty good and there are minimal power increases to be had from increasing the flow over the small distance between the exhaust ports and the turbo. Something that is important to upgrade however is the dump pipe off the back of the turbo.

The dump pipe is the pipe that connects the back of the turbo to the rest of the exhaust. Most incorporate a 90° change of direction, and it's this bend



Old vs new... if an exhaust offers less resistance, there will be more power gains to be had from the new system. Which is why quality aftermarket exhausts offer larger diameter than stock tubes, as well as mandrel bends for increased flow

bent piece of tube. The wall on the outer radius of the bend is stretched and thinned, while the inner radius wall is compressed and becomes thicker. CNC benders are capable of factoring

pressure is essential to an engine's ability to run properly. While they have an element of truth, at the same time, they're not exactly correct either.

"On the late-model 3.0L to 3.5L

IF YOU DON'T UPGRADE THE DUMP PIPE, YOU MAY AS WELL NOT BOTHER

that has the potential for gains when upgrading from standard.

"If you're going to buy an exhaust system for your turbocharged diesel that doesn't include the dump pipe, then you may as well not bother," Brian says. "Factory dump pipes can be quite restrictive, and opening them up will free up a significant amount of power. Power and fuel economy gains of between 10-12% can be made by fitting an upgraded dump pipe and a tuned exhaust system."

BENDS AND MATERIAL

It's the age old question, are mandrel bent exhausts truly as good as people say, or are press bends a more cost-effective option? "When a section of tube is press-bent," Brian explains. "The metal on the inner radius is compressed and can often ripple as the angle is increased. This can cause a bottleneck effect on the exhaust flow as it reaches the narrower section of pipe, affecting performance."

"Good-quality mandrel benders are not cheap, but they are unmatched in being able to produce flawless bends quickly and with minimal distortion of the tube. When looking at a normal

in the bend elongation and are able to maintain a uniform thickness of the pipe throughout the curve. So it not only keeps the tube diameter the same along the entire length of pipe, but the wall thickness too."

There's two common materials used to make exhaust systems, stainless steel and mild steel. Stainless steel will last longer and avoid corrosion, somewhat important for a 4WD. While mild steel tends to have a slightly shorter service life, but is much more affordable.

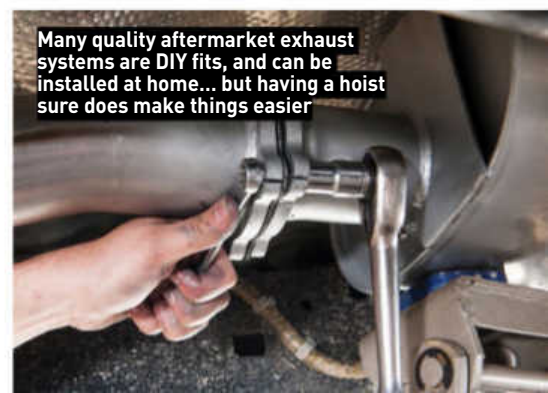
"We did a lot of work on our turbo dump pipes to get the best possible heat-dispersing properties from them," Brian says. "We tried making them out of stainless, which heats and cools too quickly, as well as several other materials. In the end we settled on mild steel that has been HPC-coated giving the best heat properties without costing the earth."

SIZE VS PERFORMANCE

There is a lot of misinformation regarding aftermarket exhausts. Many people believe you can't have too large a diameter pipe, particularly on turbocharged vehicles, or that back

common rail turbo-diesel motors, many people often go for 3in or bigger systems," Brian says. "What we've found, however, is that a slightly smaller 2.75in pipe diameter is optimal for torque production and works extremely well overall." It's all about matching your exhaust to your engine.

The other common myth is that engines need back pressure to run efficiently. This is not exactly correct either, it's more a question of exhaust gas velocity. Think about as the gases travelling down a 3in-diameter pipe. Those same gases being forced down a 2in pipe will be moving a lot faster than they would through the larger one. If you go too small, the engine has to use more of its available power to force the gas through the pipe. If you go too big, the gases actually lose their velocity. One of the key factors with aftermarket exhausts is to get the right-sized pipe to suit your engine.



Many quality aftermarket exhaust systems are DIY fits, and can be installed at home... but having a hoist sure does make things easier



Unfortunately picking up bad fuel is more common than you would think. Usually the fuel is contaminated with water, which blocks the filter and damages injectors. Only buy fuel from service stations with plenty of traffic, and never store fuel in jerry cans for long periods of time

FUEL SYSTEMS

Make your fuel system sing with these simple upgrades

Fuel systems used to be a simple affair, a mechanical pump and a carburettor on a petrol 4WD. Or a mechanical injection pump on a diesel. Simple stuff. These days, though, with the popularity of electronic injection taking off for both petrol's and diesels things are a whole different ball game. To keep things simple we'll be talking about the three most common fuel systems today. Mechanically injected diesels, common rail diesel, and electronic fuel injection (EFI) petrols.

Mechanically injected diesel is by far the easiest to squeeze big power gains out of. The engine crankshaft drives a single plunger high-pressure fuel pump. As the pump rotates the plunger builds up pressure and individual valves open up, sending fuel through the high pressure lines and down into the

engines diesel injectors, the whole lot is controlled by a cable run back to the accelerator, simple stuff.

Electronically controlled diesel makes things a little more complicated. Older systems often run the same as a mechanical setup, but with the valves being controlled by the ECU, rather than mechanically. The most common electronic diesel injection system is common rail. This works by a high-pressure pump driven off the engine pumping diesel up into a single fuel rail on the head. Off this rail are individual electronic injectors that ramp up the pressure and fire diesel directly into the cylinder. The whole lot is controlled by the ECU, the ECU can also control fuel injection rate, injection timing and quantity.

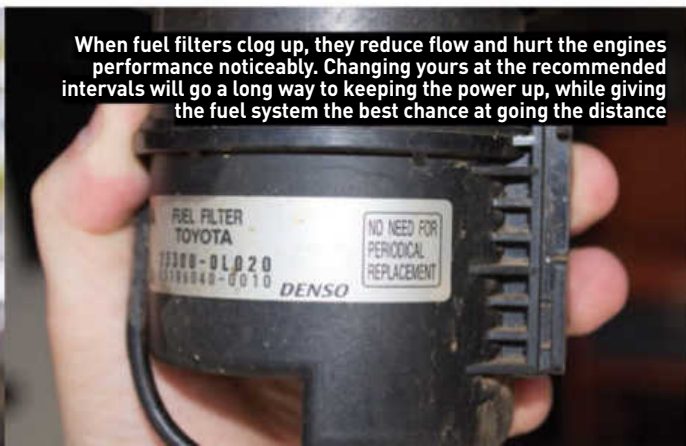
Electronic fuel injection with petrol's,

Checking the air-fuel ratio of your engine on a dyno is the best way to determine if it is operating as efficiently as possible. Diesels need to run clean, meaning more air to fuel. Petrol engines need to run a little richer, so more fuel than air. Get the mixture wrong, and the results could be costly



works much the same as a diesel. The exception being due to the lower fuel pressures required they'll run an electronic pump, up into a common rail controlled by an ECU which then sends fuel into the injectors. Direct injection is where the injector squirts fuel straight into the cylinder, non-direct injects it into the inlet manifold before the inlet valve. For this we've had Tony Martin from MTQ Engine Systems back on board as well as Ken Ringrose, one of the diesel gurus from United Fuel Systems and picked their brains about everything fuel system related.

When fuel filters clog up, they reduce flow and hurt the engines performance noticeably. Changing yours at the recommended intervals will go a long way to keeping the power up, while giving the fuel system the best chance at going the distance



INJECTORS & PUMP MODS

Fuel injectors, whether they're for petrol or diesel, are a lot more complicated than they first seem. Rather than just squirting fuel in they're actually designed to spread it in specific patterns to maximise burn efficiency and get the most bang out of your engine. In an electronically controlled engine the individual injectors are controlled directly by the ECU. A signal from the computer opens the injector and sprays the pressurised fuel into the engine, the amount of fuel controlled by how long the injector stays open, also known as the pulse width.

With mechanical injection the fuel pump sends pressure up the line to the injector. When enough pressure is built up the injector opens and squirts fuel into the engine.

"With most 4WDs there's not a great deal of room to play with injectors," says Tony. "With a diesel they're matched to the fuel pump. But with a petrol you can fit larger injectors if you find fuel supply is an issue. This generally takes a lot of power to reach that level though."

With common rail diesels performance

ADDITIVES

There's a lot of products on the market that claim to increase fuel economy and free up some ponies at the wheels. There's a lot of back and forth over what products do work, and what ones are better left sitting on the servo shelf. In most cases they're best off used to get you out of trouble, rather than relying on them for day to day use. If you're in the middle of the outback filling your tanks with fuel that could best be described as questionable, a bottle or two of octane booster would be a smart move. But it's never going to be as good as the real thing. "We'd definitely recommend people use the right rated fuel in the first place, rather than using other products to top up," Ken says. "The reality is there's a lot of good products on the market that can legitimately help get you out of a bind. But there's even more that'll do nothing at best, or could lead to potentially catastrophic engine failure."



can be increased by ramping up fuel pressures, keeping injectors open longer or having them open earlier. With a mechanically injected diesel things aren't so simple. If you're chasing big power and fuel economy is low on the priority list you're going to need injection pump mods, it's as simple as that. "We've been doing a lot of work with our TD42 injection pumps lately," Ken tells us. "To help push more fuel into the engine,

needed for every cycle ramps up. The factory fuel pump and even injectors can struggle to keep the fuel up to the engine fast enough. When you're installing upgraded fuel injectors and larger pumps you'll need to keep the pressures in check. This is the only time you'll ever need an aftermarket fuel pressure regulator. They won't actually give you any more power at the wheels, they're just part of the foundation you need to

IF YOU'RE CHASING BIG POWER YOU'RE GOING TO NEED INJECTION PUMP MODS

and alter the injection timing we're building pumps with larger plunger hears and custom cam plates internally. By tweaking the cam plates we're able to get more fuel in quicker. With a boost compensator on the pump we can wind the fuel right up without over fuelling issues down low. It makes for a reliable setup with lots of power."

FUEL PRESSURE

When you're pushing big numbers out of your petrol 4WD fuel pressure becomes a serious issue. As your engine becomes more and more efficient at making power the amount of air and fuel

start building power on.

Electronic fuel injection has taken off in a big way and it's not hard to see why. A carburettor may work fine when you're driving on flat ground but as soon as you head to the hills they're generally more trouble than they're worth. If there's a carb strapped to your petrol 4WD and fuel injection isn't in the budget there's still a few modifications you can do to make your 4WD work better off-road. The primary issue with carbs and heavy 4WDing is fuel sloshing into the carb and affecting your mixture, stalling you out at the worst time. Extended bowl vents up into the air filter, center hung floats and spring loaded needles will all make your 4WD drive like it's injected, unless you're upside down.

ENGINE MANAGEMENT

Improved engine control? That's smart thinking

Electronically controlled petrol and diesel engines are only as good as their brain or Electronic Control Unit allows them to be. Being electronic, the fuel injection systems are controlled by the ECU, which accurately judges the amount of fuel and air the engine needs to operate efficiently. But what if you need more?

Factory ECUs are usually set to conservative tunes, to allow for poor fuel and harsh running conditions. What this means is the engine is literally detuned from the factory to provide a safe buffer for its acceptable working limits. The good news for anyone chasing better performance and fuel economy from their electronic petrol or diesel engine is that a simple aftermarket performance chip can provide measurable gains in power and economy. Simply by plugging in a small box the size of a pack of BBQ matches.

By installing an aftermarket performance chip, the vehicle can be custom tuned to best suit your needs. If you tow, a higher torque setting will work well for you, or if you are chasing better economy this can also be looked into with a leaner fuel ratio. Chips open up possibilities for tuners to get the best from your engine, and in the right hands can work absolute wonders. There's a few ways they can work depending on the specific chip itself. Some chips will alter fuel pressure, either at the rail itself, or the injectors, others can alter timing or boost. They'll generally do this by tapping in either before or after sensors and altering the signal the ECU receives or sends out. David Inall from Manumatic came on board for this one to tell us exactly how performance chips work, what they

POWER TO THE PETROL

It's not just diesel powered 4WDs which benefit from aftermarket chips, but in many cases petrol powered trucks do too. As the principals are the same, a piggyback ECU will allow tuners to do their thing, and get the most from an engine.

As an added benefit, some petrol specific chips allow for the computer to work across two different maps. What this means, is if you run a vehicle with dual fuel (petrol and LPG), each fuel can be set-up accordingly meaning the vehicle will run as well as it does on petrol as it does on gas. This also means if you want to run a conservative tune for around town, and a more powerful tune for 4WDing, it can also be built in.

WHEN YOU'RE TOURING IN REMOTE LOCATIONS RELIABILITY IS KING

Diesel performance chips tweak the factory engine tune to offer more power, and better fuel consumption. Best of all in most cases they are 'plug and play' and take only a matter of minutes to install



WHAT ABOUT OLDER DIESELS?

Older mechanically injected diesels don't require a chip, and in-fact can't be fitted with one anyway. The reason they don't need a chip, is the mechanical pump can be worked with to produce the same results. Electronically controlled diesels rely on the computer to control the amount of fuel needs to be squirted through the injectors.

If you want more power, or have fitted a turbo to an older oil-burner, by adjusting the fuel mixture screw on the fuel pump the extra fuel can be dialled in, providing a bigger bang. You will have to be careful here however, more fuel equates to more heat, which isn't a good thing at all. A few minutes on the tail end of an Air-flow meter on a dyno will have you running better than new, without any fancy electronics to go wrong or have to tune around.

can and can't change, and what sort of performance you can expect.

Whether you choose to go custom, or off the shelf will come down to what you need from your vehicle. If it's just a bit of extra power for when the truck is loaded up on holidays, it would be hard to go past an off-the shelf tune. Best of all, many chips these days are adjustable meaning the tune can be played with further to get even more power out of

DO THEY REALLY VOID MY WARRANTY?

Now this is a hot topic that has been discussed around campfires all around the country, will a performance chip affect the manufacturer's warranty on a new vehicle. Many chip manufacturers claim not, while we hear of new vehicle manufacturers not being fans of them. To get the low down, we once again spoke with David from Manumatic, who cleared the water on the topic.

"This cannot be done", responds David. "If a manufacturer wishes to void warranty and can prove any aftermarket accessory fitted to a vehicle was the cause of any failure, then it is entitled to do so. The emphasis here is on the word 'prove', as the responsibility lies with the Original Equipment Manufacturer and not the consumer. However, this applies to any aftermarket accessory, not simply a Chip. For example roof racks cracking roofs, or bullbars which crack the front sheet metal". Ultimately any accessory fitted can run you into strife with the manufacturer, some may just be less of an issue than others.

the engine. Often this is with the simple turn of a screw, and when combined with a skilled dyno tuner, can result in noticeable increases in power.

Custom tunes make a world of sense in high performance vehicles or comp trucks. When you're touring in remote locations however, reliability is king. This isn't to say that custom tuned chips are unreliable. We're not saying that at all! But when you break down in the middle of no-where, it's nice to know you can have a simple replacement part mailed out to you, rather than an expensive tow to an engine rebuilder after running a motor too hot, and burning a piston.

"Before addressing the question of custom tunes, you need to ask yourself, from where has the base tune in the Chip originated?" says David. "In most cases, the answer is, somewhere in Europe which has totally different climatic conditions, operating conditions and very different diesel fuel. So, after verifying physically from where the Chip originates, the next thing to verify is where the calibrations were developed. Only a couple of the Chips



SAME COMPUTER, MORE POWER

Not all factory ECUs are created equal. While some are as locked down as Fort Knox others can be poked, prodded and tweaked to get maximum performance out of your 4WD. There are several benefits of retuning your factory computer and if you're chasing the most out of your bus it's definitely an area worth exploring. A few of the claimed benefits of ECU flashing are:

- Direct reprogramming of the factory computer using flash technology
- Can be combined with Dyno Tuning to tailor the tune to suit the specific vehicle and modifications
- Up to 12% improvement in fuel economy
- Improved throttle response
- Quicker acceleration
- No add on modules or cutting into the factory wiring loom
- Guarantee against flash file defects for the life of the vehicle
- Substantial warranty insurance against mechanical failure

sold in Australia had their calibrations developed here. So, the chances of requiring a "custom tune" to the Chips from the majority of Distributors are quite high," David says. "The other occasion on which custom tuning would be required would be if a major item such as exhaust system or Intercooler were altered from standard."

POWER V ECONOMY

No matter how much power you're chasing from your engine, at the end of the day it all comes down to a balancing act. You don't want to put your foot down and have your diffs grenade any more than you want an engine that wouldn't pull the skin off a rice pudding, or one that chews through the juice quicker than a Mr Universe contestant.

Having more grunt under the right pedal can mean the difference between making it up that incline and breaking out the winch, and can even aid in driver fatigue when tackling a long trip. If you're pulling a trailer and have an entire household worth of possessions, having the power to not worry about what gear you're in or having to get up enough momentum before that hill makes for a much more relaxing drive in our experience.

Just about all engines respond differently to different things though, so talk to those in the know before taking out a second mortgage to get your old Land Rover singing. It's about addressing the weak areas of your motor's power delivery and tweaking them to suit you. If you spend \$100 or \$10,000, if you're not modifying your 4WD to suit both your requirements and your engine's characteristics, you're probably wasting both time and money. Think about what you're chasing and work out how to achieve it. It may well cost less than you think!



POWER-MOD LEGALITIES

When modifying your 4WD for more power it can get expensive quickly as most of us have learned. That's why it's pointless to drop a lot of coin on making your truck go harder only to get stopped by the closest highway patrol unit and get slapped with a defect notice.

We've seen it happen before, and the fallout not only costs you more money, but can often turn a fun and exciting project into an expensive money pit. When considering any major mods to your 4WD, get in touch with an accredited engineer before you crack out the tools. Not only will they tell you if what you're planning is legal, but they're also great for picking up a few hints and tips that'll help you save both time and cash, and get you out on the tracks that much sooner!



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INCREASED EFFICIENCY



INCREASED
TOWING POWER

A photograph of a dirt road in an Australian outback setting. The road is reddish-brown and curves through a landscape with eucalyptus trees. A vehicle is partially visible on the right side of the road. The title 'THE GOLDEN OUTBACK' is overlaid on the image, with 'GOLDEN' in a yellow box.

THE **GOLDEN** OUTBACK

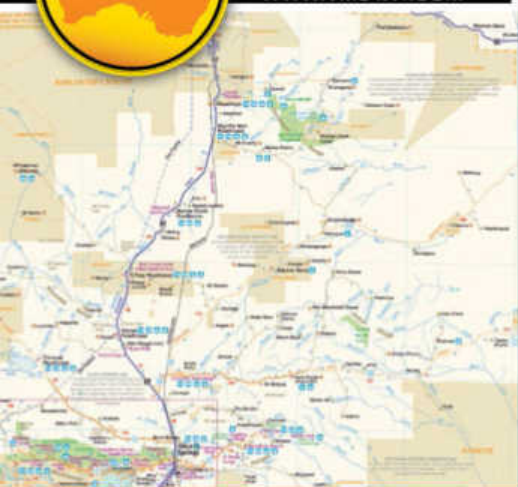
The Binns Track will take you through some of Australia's most remote and rugged country. From National Parks to Cattle Stations, you'll see it all on this sensational slice of Oz

WORDS AND PHOTOGRAPHY BY KATIE HOUGHTON





ITOPPO MAPS BY
VMS
WWW.VMS4X4.COM



FACT FILE

WHERE:

The part of the Binns Track featured in this article starts east of Alice Springs and heads north until Tennant Creek, it is an alternative route to driving the Stuart Highway and is around 970km in length. There are extra kilometers if visiting Ross River Resort, Trepghina Gorge, Gem Tree, Box Hole Meteor Crater, Murray Downs Station, and Davenport Ranges 4WD Track. Adding each of these side trips will mean an extra 100km combined of travel.

INFORMATION:

The first part of the trip instantly immerses you into the East MacDonnell Ranges which allows you to explore amazing scenery and sacred Aboriginal sites. Trepghina Gorge National Park, N'Dhala Gorge National Park and Ruby Gap National Park all give you an amazing opportunity to explore incredible landscapes with intense 4WDing and excellent walks. Arltunga History Reserve allows you to step back in history of white settlement to the area and the gold rush. You can explore old mines, information Centre and walk through the buildings and mining sites all for free. Gem Tree will give you the opportunity to fossick for Zircons and Garnets and show you the ropes. As you drive along the Binns you will be going through numerous stations and Aboriginal communities don't be afraid to give a wave or have a chat it all adds to the adventure.

CAMPSITES:

Trepghina Gorge Campground

Arltunga

Old Police Station Waterhole



Before you leave the red centre of Alice Springs, make sure you are loaded with food, water and fuel as you are about to go remote. Drive south to thread past the Todd River at the edge of town then follow the Stuart Highway and get into the adventure of the East MacDonnell Ranges. Don't get too comfortable in your seat as you'll find your first interesting stops, Emily's Gap and Jessie's Gap, just 14km out of town. Not far

down the road is Corroboree Rock which is another significant cultural site of the traditional owners, the Arrernte people. After 25km you'll spot the turn-off for Trepghina Gorge Nature Park, or if you continue for 12km, you can set up base for your first camp at Ross River Resort. Trepghina Gorge Camp is a bush camp, features excellent bushwalking and is your first taste of 4WDing in the East Macs. The scenery is just incredible with ever changing colours throughout the day. The ghost gums



SOME SECTIONS ARE TOUGH WITH LARGE ROCKS AND SOFT DRY CREEK BEDS



Large rocks can make the trip slow but the surrounding scenery is all worth it



FUEL & SUPPLIES:

Stock up in Alice Springs as the further remote you travel the higher prices will be. For Example, diesel was \$1/L more in Murray Downs than in Alice Springs.

The track is slow going so you will not be chewing through fuel but you need to be prepared as the distance between fuel stops is very large.

Basic fuel and supplies are also available in Gemtree and nearby Atitjere as well as Murray Downs.

WHAT TO TAKE:

Plenty of food, minimum five litres of water per day per person, spare fuel. Protective hats, clothing, sun cream, insect repellent and a first aid kit. For most of this trip there is no phone reception so it is highly advised to have a satellite phone.

BEST TIME TO TRAVEL:

May to October because of cooler weather and lower rainfall. Be prepared for cool evenings, collect fire wood on the track before you reach camp. In the cooler months flies and mosquitos are less common but still there. Checking with station owners and park rangers is advised before departure to check conditions of each section of track.

With even the smallest fall of rain many parts of this track will not be suitable for towing off-road camper trailers and will be hard going for 4WDs. Please call ahead and check track conditions so it is an enjoyable journey.



The spectacular scenery of East MacDonnell Ranges

in the area definitely stand out, you can even check out the biggest ghost gum in the Northern Territory which is located just at the entrance to the Nature Park. Ross River Resort is a caravan park style camp with an outback feel that has a few extras, the beauty is you can choose where to stay to suit your style of touring.

The next stop on your tour is a step back in time to Arltunga Historic Reserve. Arltunga was the first town

in central Australia long before Alice Springs. The rush to Arltunga was for gold but sadly no one struck it rich. There is an information centre on the site with artifacts and plenty of information that'll impress your mates around the campfire. All you need for the day is plenty of water, a head torch and good walking shoes and you can climb in and out of old tunnels and shafts and get the feel for what it was like to be a miner.



The biggest ghost gum in the Northern Territory



Not a bad feed at some of the waterholes along the track



IT'S ONLY 14KM BUT IT'LL TAKE YOU FOUR HOURS AS THE 4WDING IS EXTREMELY DEMANDING



This next section is where you begin to become remote. The Binns Track turns and heads north-west through Claraville, Ambalindum and The Garden Stations before you drive past the homesteads. It's important to leave all the gates the way you find them. The track at this stage is in good condition with some larger rocks and dry creek beds.

You will then come to the T-intersection of the Plenty Highway - the Binns Track heads west but while you're here it's worth checking out the campsites at Gemtree, 8km east of the intersection. When driving on the one-lane Plenty Highway, slow down for oncoming vehicles and pull over towards the left but continue to move. When trucks are oncoming move

completely off the road and pull over as they have right of way. Gemtree is a privately owned and operated park that has both powered and non-powered sites to relax in. Kate and Aaron at Gemtree will steer you in the right direction of many fun activities such as tag-along fossicking tours. Be prepared to get dusty and muddy and hopefully hit the pay-dirt! For the ladies if you find well-sized garnets or Zircons, Gemtree will make it into a nice piece of jewelry to remember your adventure.

Once you're on the move again both Gemtree and nearby Atitjere offer basic supplies and fuel on the Plenty Highway before you turn off and head north to the Sandover Highway. Expect this track to be a

full day of driving, so buckle up and get comfy. Some sections are tough with large rocks and soft sandy dry creek beds. Make sure you've suitably dropped your tyre pressures to reduce the chance of damage over rocks, glide over the soft sand and grip up the rock shelves. You will come to a T-intersection on the Sandover Highway where fuel is available from Arlparra Store or Ammaroo Station. The section north from Ammaroo to Murray Downs is mulga country showing off amazing red sand, low shrubs and a few cattle. Remember the sand heats up during the day and becomes slippery as it heats up.

Murray Downs is a fantastic station to pull into for the night. You can camp on nice green grass

THINGS TO DO:

For the family Gemtree offer fossicking tours for \$80 per vehicle, this gives you a fossicking guide, equipment and a stone appraisal of what you have found. As an alternative they have buckets at camp for a smaller fee you can go through.

Dad and the children will love fishing and yabbing along the Binns track in the waterholes.

Arltunga Historic Reserve allows you to discover the history of the oldest town in central Australia at the Information Centre. The kids or over grown kids will love to then put their head torches on and climbed down, through and up the old mines. You can walk through the old buildings of the mine manager, police, goal and mine production building. Best part it is all free.

Davenport Ranges allows you to enjoy the wildlife, awesome four wheel driving, ideal camping and walks through history all for just the small camp fees.

TRIP STANDARD:

This trip is rated C with some sections being rated a B. This trip is suited to experienced 4WDers only. There are soft rocky creek beds, bull dust holes and sections of red sand that become softer in the heat of the day.

RESTRICTIONS AND PERMITS:

There are no restrictions or permits required for this trip which makes preparation for the trip a little easier. Most of the time you are travelling through private stations, Aboriginal land or National Park. As such you must leave gates how they are found and be respectful to all land you are visiting.

KEY CONTACTS:

Trephina Gorge National Park- Tennant Creek Parks and Wildlife
PH: (08) 8962 4599

Gem Tree

PH: (08) 8956 9855
E: gemtree@gemtree.com.au

Murray Downs Station

PH: (08) 8964 1911

Davenport Ranges - Tennant Creek Parks and Wildlife

PH: (08) 8962 4599

Outback Vehicle Recovery Alice Springs

PH: (08) 8952 1087

Ali Curung Police Station

PH: (08) 8964 1959



Be mindful of the large stretches of red sand that heat up during the day, as they can become very slippery

with hot showers and amenities and station staff are always up for a yarn around the campfire. Murray Downs has a small store and fuel but remember you are very remote and supplies are only fortnightly so prices may also reflect this.

Heading north of Murray Downs you will embark on the magnificent crossing of the Davenport Ranges. This track is slow going with many dry creek beds and rocky country, the landscape is so spectacular with so many golden colours, if you have a photographer in your 4WD this will be a long journey! Errolola Waterhole is on the western side of the track and is the perfect place to get out and stretch the legs for morning tea. Amazing wildlife and birds surround the waterhole and it wouldn't hurt to drop a line in - you never know, you might catch dinner!

Pushing on you'll come across

Hatches Creek which is surrounded by old mine ruins that you can walk through and explore. Just make sure to read and obey warning signs and be aware of open shafts if you are travelling with children.

Once you're on the move again, you'll pass through an aboriginal community, continue along and you can settle down for the night at Old Police Station Waterhole Campsite, situated on a large billabong. The waterhole is perfect for a walk to see the old police ruins, wet a line, read a book by the water, photograph the wildlife or simply sit under a tree on the water's edge. If you are keen to get back in the 4WD there is a loop road at Old Police Station to the lookout. The Frew River Loop Track is only 14km but it'll take you four hours as the 4WDing is extremely demanding and no trailers should be taken up this track. It's very rocky



Have a go at fossicking for garnets or zircons at Gem Tree

Check out some mining history at Arltunga, the oldest town in central Australia





FORGET HOW PASSABLE IT LOOKS



Looks can be deceiving. It's especially true with floodwater. Even if it looks relatively calm, even if you know every bend, dip and pothole in your round trip, floodwater never behaves how you think it will. Maybe the road underneath has collapsed, or a surge is coming out of the blue. Maybe that shallow water is flowing just fast enough to catch

your tyres at the wrong angle. You just can't tell, which means you don't have control, the water does. No matter what you're driving, no matter how passable it looks, the only way to stay 100% in control is to forget about trying to drive through. So stay safe and start preparing your Plan B at www.qld.gov.au/floodwatersafety



terrain with a few jump ups and slow going with rocks sliding under the tyres. The wildlife at the waterhole can be interesting; there is an abundance of wild donkeys which can become quite loud when braying. Dingos are definitely around and will rummage around your site if rubbish is left out, so be mindful of your scraps. There are also cattle and bulls in the area so keep an eye out when bushwalking around the Davenport Ranges.

When it is time to leave the Davenport Ranges you will come to Epenarra Station where you can fill your tank and grab some supplies to finish up your trip and prepare for your next adventure.

From here you can turn west for 119km back onto the Stuart Highway to get you back towards Tennant Creek. Or as an alternative ask permission at Epenarra to drive north to the Barkly Highway. Both roads are in fair condition so you'll be travelling a lot quicker than the previous few days. Where ever you go from here, you know you've seen the real red centre of Australia. ■



Errolola Waterhole is the perfect place to camp or have a break from the corrugations and rocks



You can camp amongst the wildlife at Old Police Station Waterhole in the Davenport Ranges

**THE BEAUTY IS YOU
CAN CHOOSE WHERE
TO STAY TO SUIT YOUR
STYLE OF TOURING**

Enjoy the afternoon getting a line wet at Old Police Station Waterhole



FORGET YOUR 14" CLEARANCE AND SNORKEL



From Birdsville to Beaudesert, from Toowoomba to Townsville and everywhere in between there are parts of Queensland that flood every year. There's also flooding which happens quickly and is unpredictable. You might think your 4WD will make a difference. But you can't see what's under

the water. There might be nothing but a 2 metre void. No matter what you're driving, no matter how passable it looks, the only way to stay 100% in control is to forget about trying to drive through. So stay safe and start preparing your Plan B at www.qld.gov.au/floodwatersafety

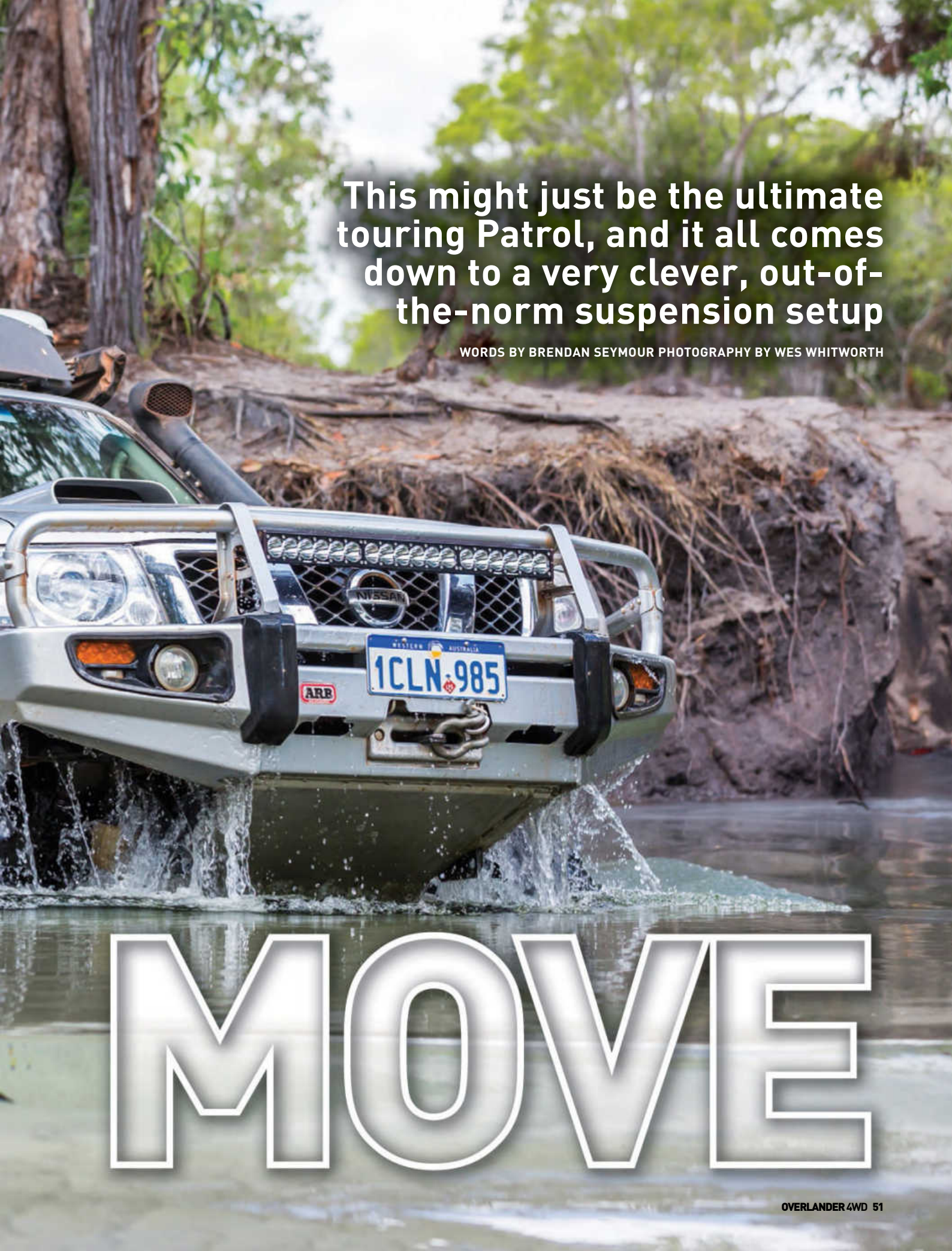


www.qld.gov.au/floodwatersafety





SMOOTH

A silver Nissan Patrol is shown from the front, driving through a river. The vehicle is splashing water, and its front end is partially submerged. The background shows a riverbank with trees and a rocky outcrop. The text is overlaid on the upper right portion of the image.

**This might just be the ultimate
touring Patrol, and it all comes
down to a very clever, out-of-
the-norm suspension setup**

WORDS BY BRENDAN SEYMOUR PHOTOGRAPHY BY WES WHITWORTH

MOVE

It's funny how the effectiveness of any modification you can make to a 4WD is open to differing opinions. To the owner who's got a new 200 Series LandCruiser with its incredibly smart traction control system, a pair of lockers is nowhere near as desirable as it is to the bloke who drives an old Triton up and down hills all weekend.

For those of us who grew up on a diet of leaf springs, jumping into a 4WD with coil springs each end is like bolting a transfer case and big muddies onto your couch at home. The ride's an unbelievable upgrade in terms of comfort, and there's no doubting that coil springs work well in almost all situations off-road.

But what if you weren't happy with a 4WD that worked 'well'? Where do you go if you've already got a coil-sprung truck like this neat-as-a-pin GU from the Western State?

Geordie and Rosemarie Clapin hail from the Perth suburb of Gwelup, and we met them while we were on our way up into Cape York. Their late-model GU looked incredibly slick at first glance, but it wasn't until we got talking to Geordie one arvo down at an east-coast beach campsite that we realised exactly what made it stand out



from the crowd – airbags.

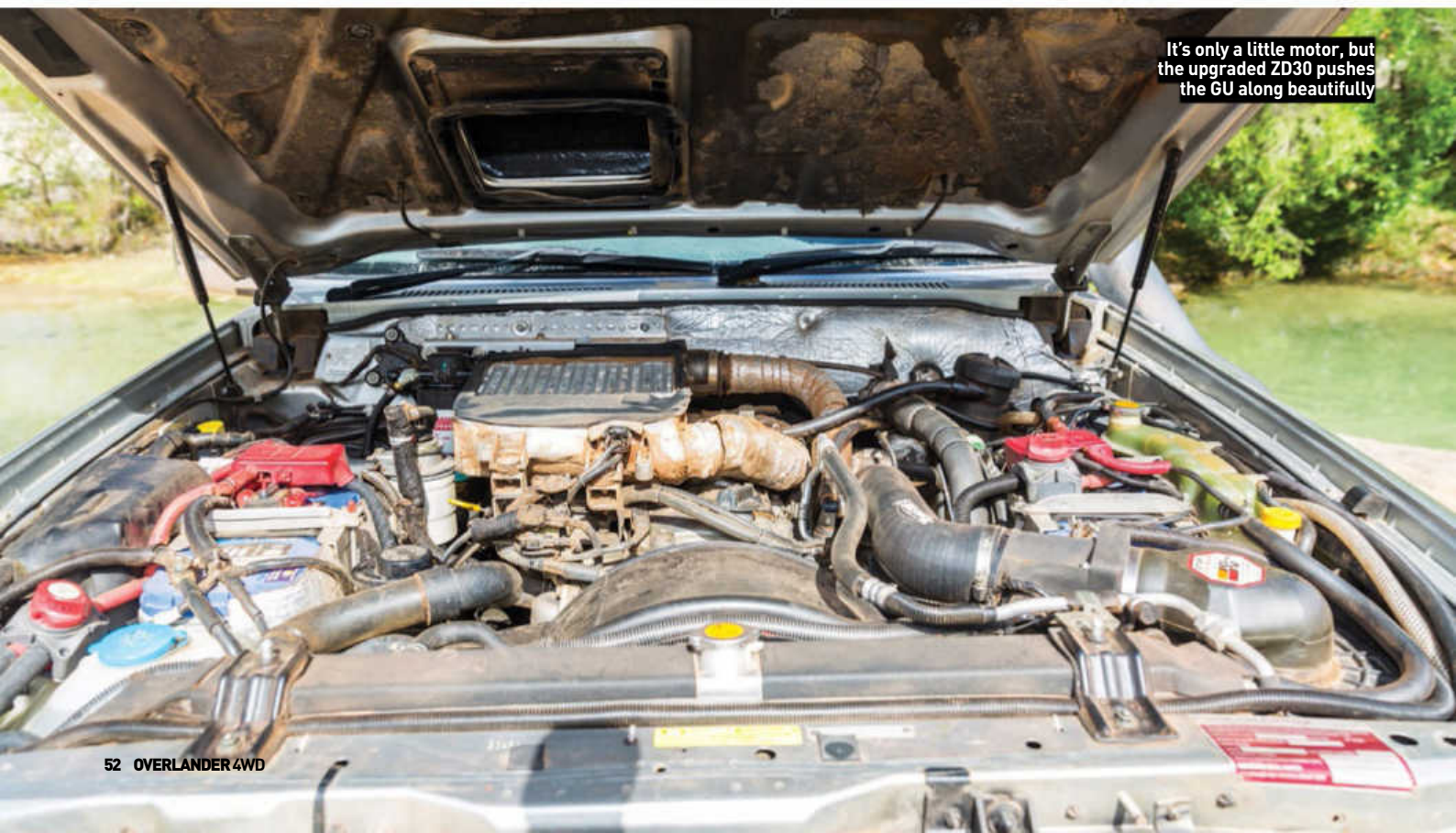
Nope, not the kind that you bung inside your coil-springs to stop the rear from sagging under load – we're talking about full coil-spring replacement airbags, the same setup you find on trucks and buses. Now, this isn't the newest technology around – it's not what you'd call 'ground-breaking' these days – but the opportunity to get out and go 4WDing with Geordie and Rosemarie for a couple of days to see how the airbags held up in a real-world situation was definitely one not to pass up.

Let's take a closer look!

"It's been a work in progress," says Geordie of his full-airbag suspension

system. "I started out with coil springs and ARB shocks, and then after a few years I got the idea that it would be nice to have full airbag suspension, so I could adjust levels and change ride height. At the moment I've got an Airbag Man Firestone airbag kit all round, and Koni 90 Raid shocks."

"The airbags give me a ride height of about two to three inches, which is quite comfortable on the highway, and I can lift it to around about four inches when I'm offroad. The handling of the airbags is beautiful – when it's at the on-road ride height it's spot-on. It now goes over corrugations far better than it ever used to before, so it's quite an improvement in the suspension.



It's only a little motor, but the upgraded ZD30 pushes the GU along beautifully

TWO OR FOUR INCHES OF LIFT AT THE PUSH OF A BUTTON

The great thing about the airbag suspension, is when we get on an un-level surface and we want to camp, we can lift the front up, drop the back down, change from one side to the other to get the bed area level."

"Initially a lot of people said 'watch out, you'll get punctures in them'. I had one leak when I went over a speed hump at Melbourne airport and had to have it all the way down to get into the carpark. I managed to pinch an airbag, but other than that since I've changed bump stops, reliability has been very good on this trip, with no leaks or other issues with the airbags. The airbags have internal bump stops but they're quite a harsh hit. I've got LandCruiser bump stops at the front and longer bump stops at the rear."

"The other suspension components I've got are Superior Engineering hybrid Superflex front control arms, and also the Superflex swaybars at the front. This all gives it a much smoother flex. At the rear, I've got strengthened lower control arms, and adjustable upper control arms to keep the diff at the right angle. I'm very happy – the whole thing is handling far better than it ever did before. I did put a stiffer swaybar on the rear and that stops the airbags rolling into corners."

"The adjustment system is from





It's suspension, but not as we know it. Full airbag setup replaces coils at all four corners

America, and it's called Air Ride. It's got a little hand controller so I can individually pull the front left, right, up or down, and the rear left, right, up or down. It's quite handy for pulling into the driveway at home – I can drop the airbags down and pull the camper in under the eaves at home, then come out and lift it up again at the right height."

"The standard motor is still in there, the three litre ZD30," Geordie says. "I've got a larger intercooler on it, which was one from A.R.E. It's their larger air scoop too, which seems to make a big difference with the amount of airflow through the bonnet and into the intercooler. I'm running quite a bit lower exhaust gas

temperatures, and better cooling with that scoop and 'cooler on."

"I've turned up the turbo boost. I'm running about 20psi and use a little valve called a Dawse valve to keep the boost down to 20psi so it won't over-boost. It's got a three inch stainless steel exhaust system on it, and I've also changed the Mass Airflow Sensor housing and inlet and outlet of the snorkel. It's now got a four inch inlet to the airbox, and a larger MAF housing. It gives it a lot better legs, breathes better and doesn't struggle up hills anymore. For a little three-litre motor, she pulls pretty well! It's got a Rapid chip, and then I've also got a secondary chip that just controls



A bigger intercooler lets Geordie run higher boost without cooking the motor



Basic drop-down table Geordie rates as one of his favourite mods

the Mass Airflow Sensor voltage so I won't cause any computer over-boost or limp mode problems that seem to be common with these engines."

"Fuel economy is not too bad – we're loaded up very heavily for this trip. There's a lot of stuff on the roof, so I've been getting around about 13-14L/100km. It's a little bit higher when we're off-road or making it work hard at speed on the bitumen. Fuel economy is reasonable. I've got 215L long-range tanks in it, 140L the back and 80L the front. With the long-range fuel tanks I've got a range of about 1500km."

"Wheels and tyres I've got on it now are 16x8in ROH alloys, and I've got Mickey Thompson P3s – the 285/7516. I've tried some 35s on it but it made the little motor struggle a little bit too much. It's much nicer for travelling just having the 33inch tyres – it seems to be a very good compromise so far."



WE REALISED EXACTLY WHAT MADE IT STAND OUT FROM THE CROWD – AIRBAGS

"I've got two Optima batteries under the bonnet. I have the same batteries, so they can link for winching, and I can also use both to start the vehicle. I have a third larger deep cycle battery in the back with the fridge. The fridge runs mostly from the two solar panels that I have up on the roof of the camper – two 110w thin solar panels glued onto the rooftop tent. They charge the fridge battery and I can also switch them over so if I have a flat main battery I've got

a system where I can switch the charge to the main battery. If I do get stuck and flatten the battery, I can switch over and sit around in the sun for the day and she's charged and ready to go again. An auto is very hard to push-start!"

"I've got headlights that have been converted to HID projector lights, and they seem to give me a good, bright light and a nice cut-off so they don't blind other drivers. They're not light everywhere, there's a nice even light

out on the road. For spotlights, I've got some lightbars up on the roof that are a very wide angle, and they just sit out to the side so they light up the side but don't light my bonnet up. I've also got a long-range high-speed spot LED bar in the front as a replacement for my spotlights. Previously I had some 55w HID spotlights, which were like two little search beams in the distance. This thing puts out as least as much or more light, and it's nice even light

across the road at 500m away, so I'm quite impressed with the lighting."

"I've got an ARB deluxe winch bar on the front with scrubrails, which have come in fairly handy for scraping against a few things on this trip. I've got their standard steel side steps, which have been adequate. At the back I've got a Kaymar dual wheel carrier which gives me that option of bringing two spares along, or I can leave one off when I'm back in the city."

"On the rooftop, I've got a custom-made roofrack to be as flat and low to the roof as possible, so when I've got the rooftop camper on, I can still get in at home and get into carparks and



NO COIL-SPRUNG 4WD CAN RIVAL THIS PATROL'S RIDE-QUALITY

things in the city. The rooftop camper is one from James Baroud and it's nice because it's got gas struts. I undo the latches and it puts itself up. It's quite a bonus when you've been travelling for a long day and can't be bothered setting up the tent or the camper."

"The rear storage that I've got setup at the moment – I've removed the back seats and I'm just using some big plastic crates for storage of spare parts, recovery gear, food, clothes, camera gear – everything just goes in the crates. That seems to keep everything all in one place when we're going through some rough tracks, and keeps the dust

out. In the back, I've got a 50L vertical water tank where the back seat would have been, and just a tap at the back for that. At the very back I've got two low drawers that the tools and other equipment go in, then a fridge slide sits on top of that. I can pull the fridge out as one drawer, or I can pull the other drawer out as a table if I need. I've also got a little table that folds down from the back door. It's the cheapest and best modification that I've done – very handy, you just flick two bungee cords and fold down the table at the back with the stove on it for a quick, easy stop without setting up a table!" ■

RUNDOWN GU NISSAN PATROL

ENGINE: ZD30 3.0L common-rail turbo-diesel

4WD ACTIVATION: Part-time, auto hubs

SUSPENSION: Airbag suspension front and rear, two to four inches of adjustable lift with Koni shock absorbers

TYRES: 285/75R16 Mickey Thompson ATZ P3s

WHEELS: ROH 16x8in alloys

OTHER GOOD GEAR: ARB touring barwork – triple battery setup – 210w solar panels – running 20psi – intercooler upgrade – stainless steel exhaust



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BEAUTIFUL ONE DAY...

Here's a look at the top five
touring destinations you need to
visit in Queensland!

COMPILED BY OVERLANDER 4WD



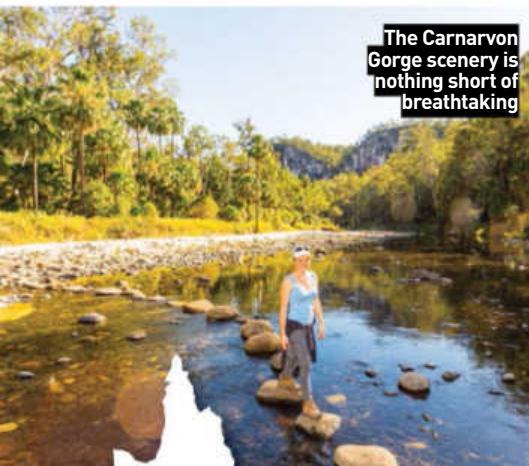
Anyone who's ever spent time touring Queensland would know just how much many spectacular off-road destinations it has. From the Cape up north to the stunning South-East coast, Queensland has something for every tourer, whether they're looking to get the family out for

a bit of relaxation on a long weekend, or whether you're looking to put your driving skills, 4WD and trailer to the test with challenging terrain.

In fact, Queensland has so many spectacular spots, that it was difficult just picking five to go into detail about! We think the five that we've picked in this article are the crème

of the crop, however there are also sensation spots that we left out including Birdsville and the eastern stretch of the Savannah Way up on the Gulf of Carpentaria. If you're planning a trip to the sunshine state, then make sure you do your research, because what we showcase in this article really is just the tip of the iceberg





FACT FILE

CAMPSITES:

CARNARVON NATIONAL PARK:

GPS: 25° 03' 44" S 148° 13' 39" E



TAKARAKKA BUSH RESORT:

GPS: 25° 04' 17" S 148° 16' 08" E



FUEL & SUPPLIES:

Supplies, groceries, spare parts and fuel are available at either Roma or Emerald. Diesel in both these places was \$1.53

TRIP STANDARD:

This trip is rated D. There are a couple of river crossings into the national park, but fairly shallow and easy crossings.

RESTRICTIONS AND PERMITS:

Carnarvon Gorge has been known to get flooded, so check with the Park Rangers before your set off for your trip. Being a National Park, dogs are not permitted and campground bookings are essential.

KEY CONTACTS:

Department Of National Parks,
Recreation, Sport And Racing
PH: 13 74 68

Roma Information Centre
PH: (07) 4622 8676

Takarakka Bush Resort
PH: (07) 4984 4535

CARNARVON GORGE

In the midst of the Queensland outback is a piece of Aussie landscape you're not going to want to miss!

Hidden in the midst of western Queensland is the rugged and wondrous Carnarvon Gorge. This piece of beauty needs to be on everyone's list of places to visit, with towering cliffs of vibrant sandstone that are hard to beat. With so much to offer in one idyllic location, it doesn't matter whether you choose to stay for a day or a week, Carnarvon Gorge won't disappoint.

Carnarvon is a photographer's dream, as the sun lights up the vast sandstone cliffs, spreading the striking golden light throughout the gorge; its sights like this that makes leaving the big smoke that much more worth it.

Have a look at the visitor centre

and pick up a map of the bush walks, there are plenty to choose from depending on your fitness level. Options range from an easy river bed walk through to the 87km, five day hike through the gorge itself.

There is so much to see and do, you need a few days to really experience and enjoy all Carnarvon has to offer. If you want to spend your next holiday in Carnarvon National Park, be sure to ring the Rangers and make a booking, as the sites do book out quickly during March-October. Carnarvon Gorge is one piece of Australia that is just stunning – it's easy to see why so many visitors return again and again!



AS FAR AS BUSH CAMPING GOES, YOU CAN'T GET MUCH BETTER THAN THIS!

FACT FILE

CAMPsites:

FIVE ROCKS CAMPGROUND:



RED ROCKS CAMPGROUND:

GPS: 22° 52' 25" S 150° 41' 05" E



WATER PARK CREEK CAMPGROUND:

GPS: 22° 50' 08" S 150° 40' 20" E



FUEL & SUPPLIES:

Food supplies and fuel is available at the Byfield Village store which is located on the Byfield-Yeppoon road. There are no supplies or facilities at Stockyard Point Township

TRIP STANDARD:

Byfield State Forest is rated as D – an easy gravel track suitable for any 4WD and camper. Byfield National Park is rated as B due to the steep sand dunes and narrow tracks

RESTRICTIONS AND PERMITS:

Fire bans may apply, and camping fees are payable for all sites. This area is inhabited by saltwater crocodiles, so be croc aware at all times.

KEY CONTACTS:

Queensland Parks and Wildlife Service

PH: 131 304

W: www.qld.gov.au/parks

Capricorn Coast Tourist Organisation

W: www.capricorncoast.com.au



BYFIELD

Whether its beach or bush you're after, this sensational coastal destination has it all!

The unique thing about the Byfield area is the amazing diversity of landscapes that it offers. Byfield is just 30 minutes north of Yeppoon on Queensland's Capricorn Coast, and features Byfield State Forest and Byfield National Park. The state forest offers rainforest walks, swimming and camping amongst the pine trees and rainforests, while the national park passes through rainforest areas to the coastline, providing lots of fun coastal 4WD tracks around the

sand dunes and along the beaches.

You're never too far from civilisation during your stay in Byfield National Park, but it certainly feels like you're a million miles away. If you love the feeling of seclusion, then the sites in the national park are for you, but if you prefer the comfort of having other campers around, then the state forest would be a better choice. Either way, the Byfield area has something for everyone, so start planning your trip today.



Some of the campsites that you'll find in the Byfield area are absolutely stunning



This is the tropics, no doubt about it, so plan your trip to the Daintree carefully



FACT FILE

BEST CAMPSITE: CAPE TRIBULATION:

GPS: 16°05'14"S, 145°27'50"E



FUEL & SUPPLIES:

Supplies, groceries and fuel are available at the Rainforest Village which is 14 km from the Daintree River ferry crossing.

TRIP STANDARD:

The Bloomfield Track is not particularly tough under most conditions and would be rated a D in dry weather and a C if wet.

RESTRICTIONS AND PERMITS:

Check for any seasonal restrictions prior to traveling. Dogs are not permitted within the Daintree National Park.

KEY CONTACTS:

QLD National Parks
PH: 13 74 68

Daintree National Park
PH: (07) 4098 9126

DAINTREE

This World Heritage listed Rainforest should be on every tourer's bucket list!

The Daintree Rainforest in northern Queensland is one of Australia's most amazing and untouched wilderness areas. It's an area often overlooked by people travelling to the Cape, yet the Daintree can make for a spectacular adventure in its own right. There are a number of animals and plants that can only be found in this region of the world and owning a 4WD gives you rare access to this absolute wonder of the world.

Like most of the top end, the Daintree's best season for visitors is during the dry season what we would know as winter. Days are warm and evenings are cool, there are fewer mosquitos and other bugs out during

the dry season so quite comfortable for sitting around a campfire in the evening.

With sensational tracks such as the CREB and the Bloomfield, there aren't too many places in Australia that offer the same action packed thrills as Far North Queensland. The whole region is a 4WD explorer's paradise and the camping is absolutely out of this world. It's a region that should be explored, not rushed and it's not uncommon for travellers to be in the north for months on end – there's simply that much to see. Next time you're heading north on a FNQ adventure, allow some time to really sink your teeth into the magnificent Daintree Rainforest.



FACT FILE

BEST CAMPSITE:

BRAMWELL JUNCTION:

GPS: 12° 05' 35"S, 142° 33' 30"E



ELIOT FALLS:

GPS: 11°22'58"S, 142°24'46"E



FUEL & SUPPLIES:

While Cape York is quite remote, in the small towns of Seisa and Bamaga there are service stations and grocery stores where you can top up on essential supplies. It is recommended that you take as much as you can with you to save on costs.

TRIP STANDARD:

The Old Telegraph Track is rated B. The track conditions can change quite quickly depending on the number of people that have crossed or the amount of rain received. Always travel with one or more other vehicles and have your recovery gear ready.

RESTRICTIONS AND PERMITS:

You will require a permit to camp at Twin Falls/Eliot Falls before arriving - so plan your dates to stay.

Before reaching the very tip, you will need to cross the Jardine River. This return trip cost \$120 per vehicle or \$145 if you are towing a trailer. This includes your camping permit to camp anywhere in the top end. The ferry operates until 5pm each day.

KEY CONTACTS:

QLD National Parks

PH: 13 74 68

The Croc Tent

PH: (07) 4069 3210



CAPE YORK

The Cape represents 4WD adventure in its purest form – saddle up for the experience of a lifetime!

There aren't many 4WDers out there that haven't spent at least a few nights dreaming of an adventure to Cape York. As the northern most point of Australia, Cape York represents one of the greatest 4WD adventures in Australia with its bonnet depth water-crossings, pristine waterfalls and

snorkel and winch will see you through the majority of the Tele' Track without too many dramas. An off-road trailer will handle the track and traveling in convoy is a must for first timers.

Without a doubt, the Cape is one of the ultimate 4WDing experiences anyone can undertake. You simply won't find

TEST OUT YOUR SKILLS, YOUR TRUCK AND YOUR TRAILER WHILE HAVING THE TIME OF YOUR LIFE DOING IT

challenging tracks. Surrounded in parts by wide-open savannah plains, lush rainforests and crystal clear creeks – talk about a visual feast!

You're going to need a well-prepared vehicle and trailer for this and pre-trip preparation is imperative. You however don't need to spend thousands of dollars on every modification under the sun to tackle the Cape. A simple 2in suspension lift, off-road tyres and a

many more epic challenges where you are confronted with days on end of some of the hardest terrain out there. You'll test out your skills, your truck and your trailer while having the time of your life doing it. All along the way, you'll find cracking campsites, scenic views and when you reach the tip, the sense of achievement is like no other. Stop dreaming, start doing, and get out there and tick the Cape off your bucket list!



There's no greater feeling than when you finally reach the most northern tip of Oz and get that iconic photo!





SE QUEENSLAND COAST

The best of both worlds with mountainous inland tracks and incredible tropical islands!

Located just 100km north of Brisbane, Maroochydore is the gateway to the sensational South-East Queensland Coast. With Moreton Island to the south and Fraser to the North, you can flip a coin in the morning and start living on island time the same day. That's not to mention a whole raft of other islands that are perfect for tourer's to explore, including Bribie and North Stradbroke Islands. If you're after some low-range tough tracks that threaten to swallow your truck whole – don't say we didn't warn you about the Glass House Mountains!

That's not to mention all the mainland

beaches such as Teewah and Rainbow that are open to 4WDs – this place really is a coastal 4WDer's dream!

This region is nothing less than an iconic off-road destination. Few tourer's don't aspire to visit Fraser Island someday, and anyone who's lucky enough to live in the area knows full well why it's regarded as a 4WD mecca. But one of the most attractive parts of the region is that it's so close to a major capital city in Brisbane, not to mention the plethora of coastal towns with all the facilities you could ever need. To say that this is an accessible destination is an understatement!



There truly is nothing else like a campsite on a Queensland beach!



FACT FILE

BEST CAMPSITE: TEEWAH BEACH:



SANDY CAPE, FRASER ISLAND:



BEN-EWA, MORETON ISLAND:

GPS: 27°08'58"S 153°22'02"E



FUEL & SUPPLIES:

There's truly no shortage of fuel and supplies in this region, even on islands such as Fraser and Moreton there's fuel and food on offer. Perhaps the hub of the region is the town of Maroochydore, which offers everything you could want.

TRIP STANDARD:

There's truly something for everyone in this area, from mild to wild. Tracks range from E grade all the way to A grade, so make sure you do your research.

RESTRICTIONS AND PERMITS:

Ferry fees and camping fees apply for most of the islands. There are also mainland coastal areas that require camping permits, so make sure you visit the Queensland Parks website and do your research before departing on any trip.

KEY CONTACTS:

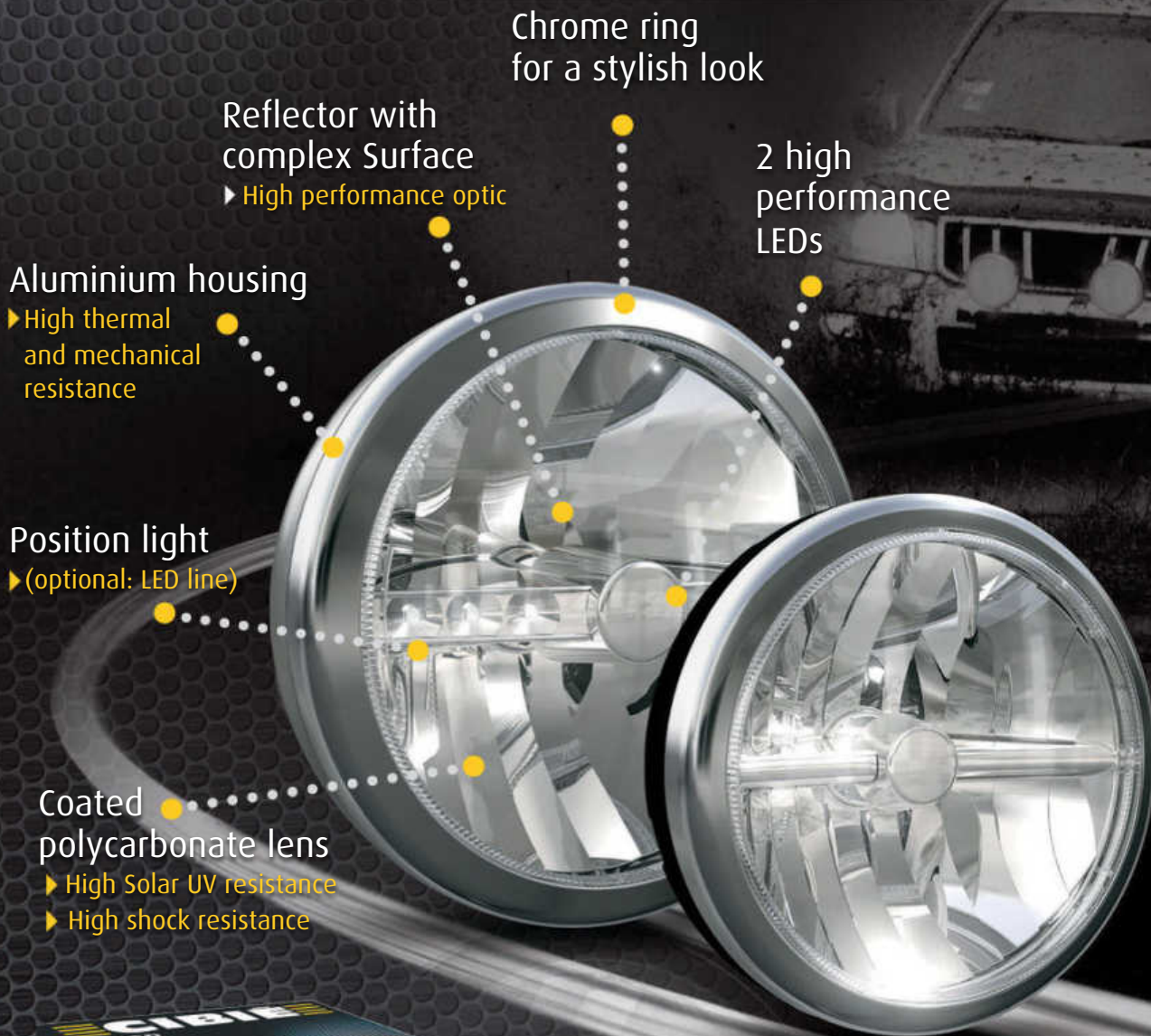
Queensland National Parks

PH: 13 74 68

W: www.parks.nprsr.qld.gov.au

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COMFORT MEETS CAPABILITY

Toyota's brand new model combines the toughness of the HiLux with the luxury of the Prado – and the results speak for themselves

WORDS BY CAHN TURNER, PHOTOGRAPHY BY PAUL BRADSHAW



Hot on the heels of the new generation HiLux, Toyota has released the all-new Fortuner. Based on the HiLux chassis, the Fortuner offers a smaller wagon package while still retaining the off-road prowess of its ute brother. There are only a few common parts – the Fortuner sits on a modified HiLux chassis, it features the same refined 2.8L turbo diesel and a few panels in front of the B pillars – the bonnet, windscreen and front door skins. The interior, exterior and even the chassis has been tweaked to create a completely distinct new 4WD.

CHASSIS AND SUSPENSION

The Fortuner chassis shares the same basic underpinnings as the HiLux and therefore is built for the same tough Aussie conditions. The high-strength chassis features the same thickened side rails and reinforced cross members as the HiLux though the biggest difference is the shorter overall length. The Fortuner's wheelbase is over 300mm shorter than the HiLux, contributing to its agile and responsive feel as well as improving the ramp-over and departure angles for better clearance off-road. The



Uneven tracks were soaked up by the comfortable suspension

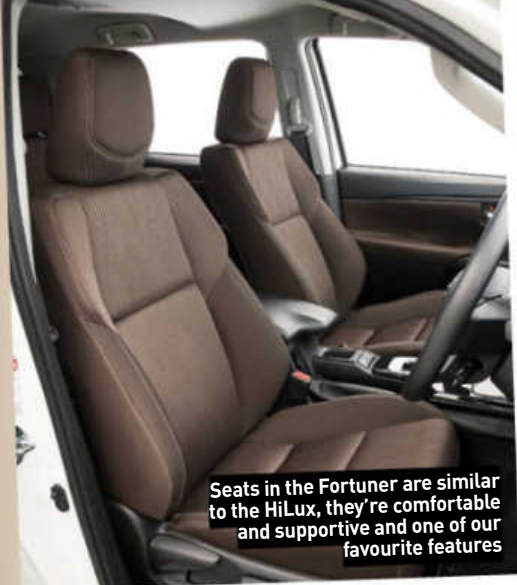
suspension is also changed compared to the HiLux, with Toyota opting for a coil-spring five-link solid axle in the rear. Designed for comfort over load-carrying, the rear coil setup gives the Fortuner a completely different driving feel compared to the HiLux – at speed, the suspension soaks up bumps and results in a quieter, smoother ride. The Fortuner backs up its smooth high-speed manners with features designed for tough off-road adventures too. Reinforced suspension towers and large diameter dampers hint at

the Fortuner's off-road heritage and capability. The front double wishbone suspension is shared with the HiLux and it strikes a good balance between comfort and off-road ability.

Toyota have designed the Fortuner for up to 3000kg towing on the manual model and 2800kg for the automatic – which means the Fortuner has a higher tow rating than the Prado by 500kg. It would make a comfortable, quiet and capable tow vehicle if you were planning to tackle some remote tracks with the family.

**THE CHASSIS HAS BEEN TWEAKED TO
CREATE A COMPLETELY DISTINCT NEW 4WD**





Seats in the Fortuner are similar to the HiLux, they're comfortable and supportive and one of our favourite features



The combination of independent front and coil-spring 5-link rear means the best of both worlds, comfortable and responsive at speed and articulation in low-range

ENGINE AND DRIVELINE

Perfectly suited for carting around the family or exploring tough low-range tracks, Toyota have offered only one engine option in the Fortuner. When an engine is as versatile as the 2.8L turbo diesel 1GD-FTV, it hardly makes sense to offer anything else. The 2.8L has plenty of go even from low revs and paired with the 6-speed manual or auto gearbox it is one of the selling points of Toyotas new range of 4WDs. On the higher grade GXL and Crusade

models, the intelligent manual (iMT) is an absolute joy to drive – it combines the fun of a manual with the smooth and simple operation of an automatic. Activate the iMT and the engine computer will constantly and instantly adapt to situations where more revs are needed. Taking off from a stop, the iMT will rev the motor up to avoid stalling and on downshifts, regardless of how suddenly you grab a lower gear, the engine will

rev-match to avoid shuddering deceleration. The automatic offers a 30Nm advantage over the manual, but both feel equally responsive thanks to the six gear ratios and widely spread torque range of the 2.8.

The driveline is part time 4WD, with a simple to activate rotary 4WD switch, as well as a factory fitted rear electronic diff lock standard across the range. The Fortuner also features an impressive Active Traction Control system that offers subtle assistance on high-speed dirt tracks, and obvious support on steep rocky inclines – we didn't need the diff lock at any point, due to the excellent performance of the traction control. Other driver aids such as Hill-start Assist Control and Downhill Assist Control confirm this is a genuine 4WD that'll comfortably take on most challenges you can throw at it.



The Fortuner is the base for a fantastic tourer – well appointed, comfortable and a powerful diesel engine, it'll haul the family almost anywhere

RUNDOWN TOYOTA FORTUNER CRUSADE

ENGINE: 2.8L 4 cylinder intercooled turbo diesel

POWER AND TORQUE: 130kW and 420Nm

GEARBOX: 6-speed intelligent manual

4WD ACTIVATION: Part time 4WD, auto hubs, shift on the fly

FUEL CAPACITY: 80L

OUR AVG FUEL FIGURES: 10.1L/100km (including low-range driving)

BRAKED TOWING: 3000kg



IT'LL COMFORTABLY TAKE ON MOST CHALLENGES YOU CAN THROW AT IT

INTERIOR AND STORAGE

The interior is reminiscent of the HiLux, but takes comfort and luxury to the next level. Front seats are supportive and comfortable; even several hours on dirt tracks there were no pressure points. We would not hesitate to put in a few long driving days behind the wheel of the Fortuner thanks to the comfortable and well thought out interior.

Not only comfortable, the Fortuner is practical too and suited for any combination of passengers. Offering 2-3-2 seating, both the second and third

rows can split for extra luggage space. Up front, the driver and passenger have access to a centrally mounted 7in touch screen for control of the radio, CD player, reversing camera and sat nav on Crusade model. Factory air conditioning with separate second row controls keep things comfortable and the upper glovebox is an air conditioned compartment capable of chilling two 600ml bottles – or anything else that'll make your trip easier.

Steering wheel controls are easy to utilise and are particularly useful when



Crusade model has leather accented interior and impressive Multi Information Display

navigating the incredibly versatile Multi Information Display (MID) in the instrument cluster. The MID is a 4.2in full colour display showing trip meters, vehicle checks and data to support your driving. The full colour MID is standard on GXL and Crusade models, while the GX offers a dot-type.

This isn't your grandma's soft-roader, the Fortuner is designed to tackle the tough stuff and take you there in style



OVERALL VERDICT

As a package, the Fortuner is a formidable 4WD that packs plenty of capability into a smaller size. Toyota have placed the Fortuner in the range to entice customers who are interested in a Prado but can't quite stretch their dollar far enough and they've succeeded. It's capable and comfortable and drives as though it'd be the perfect family tourer.

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WAEKO



AS CLEAR AS MUD

Want to avoid that sinking feeling next time you come across a mud hole? Here's our expert tips to surviving mud!

COMPILED BY OVERLANDER 4WD

Of all the different terrains available to 4WDer's, copious amounts of gluggy mud would have to be rated as one of the most challenging out there, but also one of the most fun. In fact, you'd be safe to say there's nothing better than the feeling you get as you throttle your way out of a rutted mud pit. There are dead-set thousands of different scenarios, circumstances and tracks out there just waiting to test our 4WDs ability, along with the skills of the individual behind the wheel. To help you get right in the thick of it, we've spoken to some of the best in the game, and pointed our 4WDs to some of the muddiest tracks around to bring you the best tips, tricks and proven advice you'll need to know to conquer the gnarliest mud in the country. If you thought 4WDing was already fun, just wait until you get a load of this!

Assessing and removing any potential hazards can save hours of roadside repairs down the track



UNDERSTANDING TYRE PRESSURES

When you think about it, only a few square centimetres of your trucks tyres actually touch the ground. This area is known as the contact patch. Naturally, the larger the contact patch is the more traction there is available, and the best way to do this is to lower your tyre pressures to cover a larger surface area as the tyre flattens out along the ground.

When it comes to tackling the mud, it makes sense to have as much traction as possible. While it's true that lowering your tyre's air pressures increases the tread's contact patch, you'll find that lowering the tyre to the ideal tyre pressure will also reduce the chance of a puncture out on the track as well. It does this by allowing the tyre to actually mould around sharp object rather than allow it to penetrate the tyres carcass.

The downside to reducing your

tyre pressure is you're also lowering the vehicles overall ride height and sacrificing ground clearance the lower you go. This means any low hanging components become even more vulnerable, and as your tyres sink down in all the muck you've got much more chance of bellying out. This is even more exaggerated when you're following wheel ruts carved out by other 4WDs with more clearance.

The trick is to find a compromise between the largest tyre contact patch, and the best ground clearance. The perfect tyre pressure will vary greatly depending on the particular vehicle and terrain you drive, but with enough time on the tracks, you'll get to know your "go to" pressure pretty quickly!

The downside to running lower tyre pressures is you are actually decreasing

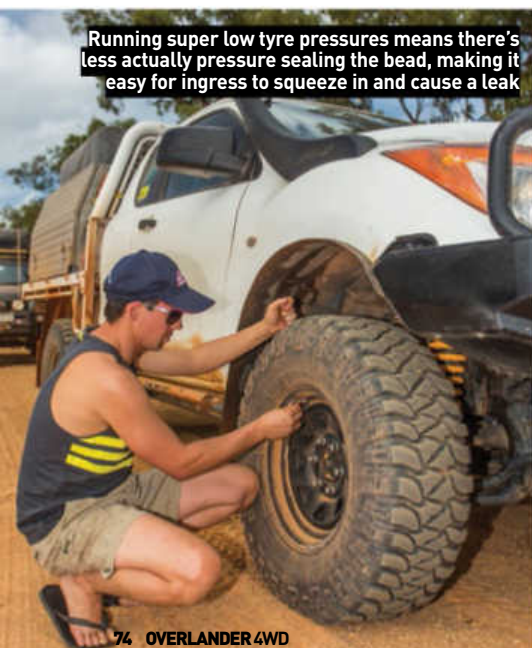
the force that seals the bead, which can allow mud to push in between rim and tyre and break the seal. Running a thin layer of Silastic around the bead of the tyre when fitting can help seal the tyre and create a stronger bond between tyre and rim.

Don't get us wrong you can still push a tyre off, but this will give it better chance of staying on. Try not to use too much as it can stop the bead sitting flat on the rim and end up causing a vibration issue.

DID YOU KNOW?

Dropping your average 33inch off-road tyres pressure down from 36psi to 18psi will increase the traction exponentially.

Running super low tyre pressures means there's less actually pressure sealing the bead, making it easy for ingress to squeeze in and cause a leak



It's important to remember that mass amounts of mud can really affect your wheel balance

TYRE CLEANING

One of the constant battles we're faced with is keeping the tread blocks on the tyres from getting clogged up with mud – as soon as that happens you might as well be running a set of slicks. Some of the better tyre brands have created mud pockets in the lugs for scooping, and channels that are designed to force mud directionally out of the tyre, but mud is always best removed by centrifugal force. The faster the wheels spin the more centrifugal force there is, which is why you'll notice thick gluggy mud will almost always clog up your tyres tread blocks when you're crawling around. Short bursts of wheel spin can actually help clean the tyres, but with no shortage of hidden objects around, vigorous wheel spin is a recipe for damage with tree roots and rocks being renowned for damaging the tyres lugs. Let's be honest, rock is always going to win in the rock vs rubber contest!



THE TRICK TO TACKLING MUD HOLES SUCCESSFULLY IS TO TAKE A FEW PRECAUTIONS BEFORE YOU MAKE THE PLUNGE

BIG MUD HOLES

Tackling mud holes can be a heap of fun, but you'll know the meaning of hard work if you wind up getting yourself stuck. Mud has a real knack for getting absolutely everywhere, and often the gear you need in a real hurry is in the worst possible place to access. Take your recovery points for example; they're always mounted low which is perfect if you like dunking your whole arm fishing around for them. The trick to tackling mud holes successfully is to take a few precautions before you make the plunge. Little things like having the bow shackles ready to go, the snatch strap already attached and a plan as to where the winch cable can anchor up to if the worst should happen can speed the recovery process right up. Plus, keeping any expensive or important gear off the floor is a given.

The biggest problem with bog holes is you never really know what to expect. There could be just about anything lurking just beneath the surface, which means there's always a certain risk

involved in taking the plunge. To help spot any hazard, we've all seen the old poke it with a stick method being used, but what do you actually look for?

Obviously, we want to know how deep the water is, but to be more precise we want to see exactly where the deepest parts are. You also want to have a good poke around for potential hazards such as logs and old car parts. A top tip is to actually check how deep each wheel rut is compared to the centre – if they're too deep you'll end up hanging the diffs up and the wheel won't be able to touch the ground. You also want to see how solid the surface is by jamming the stick as far down into the mud to see how much it sinks.

TOP TIP!

Avoid changing gear in deep mud or water. It allows mud to penetrate in-between the clutch plate and the flywheel.

SLIPPERY SLOPES

There's no doubt about it, long stretches of steep muddy tracks can be an absolute hoot! But a lack of traction on any incline or descent is also tricky business, which means a few little tricks of the trade can go a long way when it comes to keeping in control. For steep descents, the absolute worst thing you can do is lock the brakes up. If this happens you're basically left with zero traction and even less control – needless to say this is not a pleasant experience! Engine braking is the way to go. The trick is to find a gear that's low enough to keep your speed under control without using the brakes, and avoid engaging the clutch which effectively disengages the engine from the drivetrain.

Even at low speeds, traction and control simply can't be guaranteed, so there's a lot to be said for checking the track for potential hazards first. Keep a good eye out for problem spots, paying particular attention to what can happen

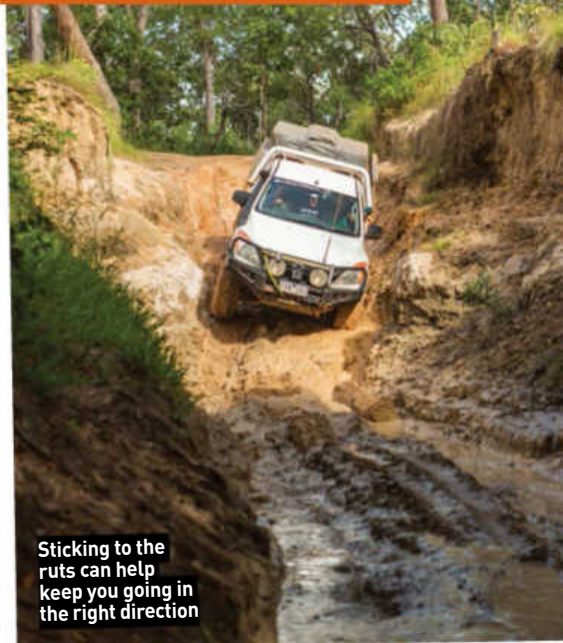
if something does go majorly wrong. In most cases, sticking to the ruts is a great way to keep your vehicle pointing where you need to go, unless the ruts are simply too big. In this case, the major concern is what can happen if you unwillingly slip into them.

Basically, successfully tackling muddy hills boils down to three tricks:

1. Pick a line and commit. It's not always easy to stick to the chosen line but having a plan means you can concentrate on actually driving rather than making more last minute decisions than you need to.
2. Pick a gear that gives you plenty of power and enough momentum to get to the top without running out of engine revs before hand
3. Avoid heading sideways at any stage on a hill climb, especially a slippery one. It's just too easy for things to go wrong!


TOP TIP!

Sticking to the ruts will help guide you in the right direction – just check they're not too deep!



THERE'S NOTHING BETTER THAN THE FEELING YOU GET AS YOU THROTTLE YOUR WAY OUT OF A RUTTED MUD PIT





A set of traction aids can give you just enough traction to gain some forward momentum and keep on going

THE OVERLANDER TEAM'S ULTIMATE MUD TIPS!



BLACK SOIL COUNTRY

TRAV - EDITOR


"The thing with black soil is it's often hard to spot the really soft patches until you're diff deep. I learnt one very important lesson early on in the piece, and that's when the wheels start spinning, you start sinking! The lesson learnt was to treat black soil like sand - once your vehicle loses forward momentum, it's time to admit defeat and back off, which means that never-say-die attitude is good for nothing in this type of terrain! By backing off early, you've got a fighting chance to pack a few rocks or logs under the wheels before a ton of mud fills the wheel arches."



LEFT FOOT BRAKING

CAHN - JOURNALIST

"Left-foot braking is most effective in a vehicle with an LSD, but it can work with open diffs too, just for a different reason. What you do is use your left foot to progressively apply brake pedal at the same time as you accelerate. Braking adds load to the wheel that's in the air, simulating extra traction and sending bits of power to the wheel on the ground that normally wouldn't spin. In the mud, try both progressively applying brake, and also giving it a couple of pumps, to find any available traction."



The lower your tyre pressures are, the lower your diff and chassis clearance is too

FINAL THOUGHTS

Well there you go, driving mud has never been more fun! Even if you're the type to avoid mud at all costs, chances are it'll eventually catch up with you at some point or another. After all it only takes a bit of rain to turn a seemingly easy track into a dead-set mission. That means it's a mighty good idea to always be prepared and carry plenty of recovery gear. If you find yourself trudging through a muddy wonderland, make the most of it - you could be in for your most epic adventure yet! ■

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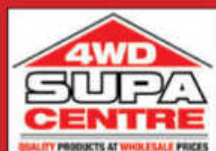
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POWER UP!

Cut through the marketing hype to find the right battery for your needs

WORDS BY ALLEN HODGES PHOTOGRAPHY BY OVERLANDER 4WD



When it comes to the battery in your 4WD, which battery is best for each application? Most 4WD manufacturers are still using the conventional lead acid starting battery and will choose the right capacity to suit their specific vehicle. But how do they know how YOU use your vehicle?

Have you ever wondered why your

battery keeps going flat when the fridge has been running all night, yet your mate's batteries are fine? Or what the difference between an AGM, calcium and a lead acid battery even is?

In this article, we explain all the different types of batteries available. We will also show you what's best for your 4WD and explain what all of those cryptic numbers and letters mean on each battery.

WHAT DOES CCA MEAN?

CCA = Cold Cranking Amps. This is the amount of amps that a battery can produce on start up at a given temperature for at least 30 seconds. For example; a 550CCA lead acid battery can produce 550 amps at -18°C and maintain it for 30 seconds. The larger the number, the higher the amps. The higher the number also usually means the higher the price tag.

AUXILIARY BATTERIES

Auxiliary batteries are usually a deep-cycle technology used primarily for accessories like fridges and camp lights, but can be used as a secondary starting battery when connected through a cross over switch.

A multi-purpose auxiliary battery can be good for additional winch power or added light banks too. For this you need a battery manager/ isolator in between the two circuits, however most auxiliary batteries are part of a dual battery system and will be set-up to run independent accessory loads.

The main difference between cranking/starting and deep cycle is the plate construction. The rule of thumb is that the thicker the plate the longer it will last when discharged, this is due to the plates perishing over the time with constant charging and discharging. So the thicker the plate, the longer it takes for them to break down and fail. Cranking batteries run thinner plates and more of them as they don't charge and discharge to the extent that a deep cycle battery does, therefore they don't need the thicker plates.

WHAT DOES CCA MEAN?

Six cylinder petrol 4WDs like LandCruisers or Patrols may come with a 600CCA battery, whereas a diesel in the same model would use a 750CCA battery. This is due to the diesel being a higher compression engine and needing that higher capacity to turn it over at the right speed.

A smaller four cylinder petrol engine may use anywhere from a 450CCA up as they don't need as much power to spin the motor over. Some manufacturers will use two smaller CCA batteries wired in parallel instead of one larger one in newer diesels, this will reduce the load being put on a single battery at start-up but still deliver the required cranking amps. Two smaller batteries can be more expensive than a single large one, but in principle will last longer as they don't have to work as hard as one battery on start-up.

It's become the common thing for 4WDs these days to run at least two batteries



BATTERY TYPES

CONVENTIONAL LEAD ACID BATTERY

- Requires maintenance on a regular basis as the water evaporates from each cell
- Easily sourced
- Low cost
- Cannot be used in confined space like in a 4WD cabin as the battery produces noxious gases when hot
- Can be used under bonnet
- These batteries are most commonly used as cranking batteries

MAINTENANCE FREE CALCIUM

- No maintenance required, but not completely sealed as the cells have vents to discharge any gas build-up
- Easily sourced
- Low cost
- Cannot be used in confined space but can be used under the bonnet
- These batteries are also used more commonly for cranking batteries



AGM SPIRAL WOUND LEAD ACID

- No maintenance
- Sealed
- More difficult to source
- Higher cost
- Can be used in confined space including under the bonnet
- Commonly used in caravans and camper trailer auxiliary setups and can be mounted in a 4WD cabin

AGM FLAT PLATE LEAD ACID

- No maintenance
- Sealed
- More difficult to source
- Higher cost
- Can be used in confined space, cannot be used under bonnet unless high air flow for cooling
- Commonly used in caravans and camper trailer auxiliary setups and can be mounted in a 4WD cabin

GEL CELL BATTERY

- Gel cell batteries are maintenance free
- Have excellent slow discharge capabilities in higher temp areas
- Good for camper trailers or caravans where the battery is usually housed in a confined space
- If they are being charged through your alternator you will need to run a regulator to prevent premature failure

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DO YOU NEED A DIESEL CAT?

Diesel cats can have a far greater effect on your engine than you might think... Check out Andrew's tips to make sure you're getting the most from your diesel exhaust system

WORDS BY ANDREW LEIMROTH, PHOTOS BY OVERLANDER 4WD

What is a "diesel cat" and do I need one? Diesel oxidising cat technology was introduced to reduce emissions of hydrocarbons (HC), carbon monoxide (CO) and particulate matter (PM) from diesel vehicles. We had all known diesels as the traditional smoker of the road until the introduction of this technology.

They are installed along the first engine pipe on the exhaust and operate from as low as 100°C to about 700°C.

Whilst we never really saw this technology installed in non-turbo 4WDs we have slowly seen it filter into the ever growing turbo diesel engine market. They work well and the few we have seen on privately imported non-turbo diesel engines have shown no visible emissions out the tailpipe.

Fast forward to aftermarket exhaust upgrades and suddenly a debate begins as to the need to reinstall a cat. The idea of upgrading an exhaust system on a modern diesel engine comes about with much sales chatter attached. Not surprisingly quite a few aftermarket

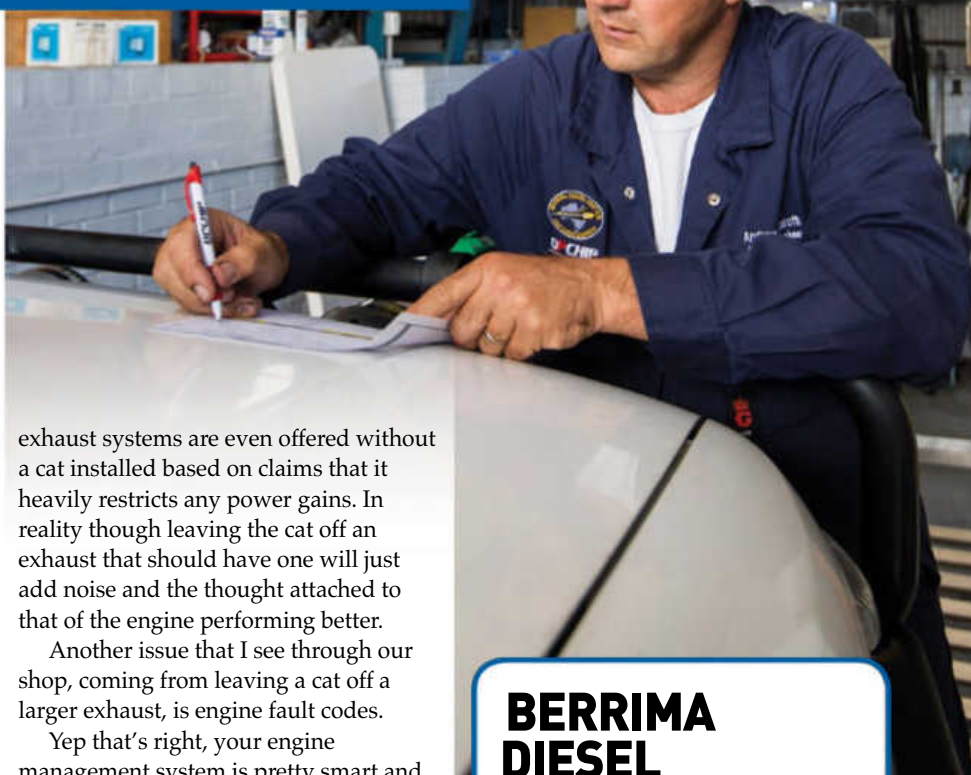
exhaust systems are even offered without a cat installed based on claims that it heavily restricts any power gains. In reality though leaving the cat off an exhaust that should have one will just add noise and the thought attached to that of the engine performing better.

Another issue that I see through our shop, coming from leaving a cat off a larger exhaust, is engine fault codes.

Yep that's right, your engine management system is pretty smart and so leaving a cat off, on a system that should have one on, can lead to turbo boost spikes etc.

Remember that money is hard spent and sales talk can often leave the buyer unaware of their legal obligations to keep their vehicle in a safe and legal operating condition. More immediate issues from a poorly designed exhaust can include engine fault codes and much money spent before the simple reason is found. Speak to your diesel expert if you have concerns about the next upgrade to your engine's diesel exhaust system.

Andrew Leimroth



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BIG TRIP CHECKLIST

About to set off on your next adventure? These simple checks could save you serious time and money by catching potential problems at home before they develop into real headaches off-road.

SPRINGS

The majority of spring related issues are usually found around the spring mounts as it's the mount that bear the majority of the vehicle's load. Inspect the springs, mounts and shackles for cracks, broken welds, rub marks, abnormal bending and excessive sagging. There are upgrade kits available to add strength to potential weak points of many common 4WDs. For example, a rear tower brace can be fitted to GQ/GU Patrols to prevent the rear coil mounts from bending up and crushing the brake lines over rough terrain.

SHOCKS

Start by visually examining the shock body. Look for any sweats or leaks around the shaft seal at the top, cracks in the eyelets around the welds and stone damage to the shock casing. Also check the shaft boot is in good condition and the piston shaft is not pitted or bent.

Your rear shocks are more prone to

damage from rocks flicked up by the front wheels, particularly those fitted to the front of the rear axle like on some LandCruisers and HiLuxes. The same applies to your camper trailer. If you find this is the case, it might be a good idea to fit a shock guard to the front of your shock absorbers to prevent further damage.

SWAY BARS

The bigger your suspension lift the harder your sway bars must work to keep the vehicle stable. Be sure to check the sway bar link bushes and D-bushes, and replace them if they're cracked, torn or have excessive movement.

Also check the links themselves for bends or breakages, particularly in the rear, and nip up the link nuts to ensure there is no movement. Remember, the rear end of your 4WD's suspension will be working overtime with a trailer in tow.

BUSHES

Worn bushes are the most common causes of suspension knocks. Use a pry bar to check every bush for cracks, tearing and excessive movement, and replace any that look questionable. Incorrect installation or over extending a bush are the two leading causes of premature bush failure.

What to check before your next big off-road adventure

WORDS BY BRAD GREEN,
PHOTOGRAPHY BY OVERLANDER 4WD



STEERING

The best way to check for play in the steering is to wiggle the steering side to side when the vehicle is on the ground. This provides enough resistance to accentuate any excessive movement in each steering linkage. You can then double check each linkage by jacking the vehicle up and levering on each joint with your pry bar as you should a suspension bush. Work your way down from the steering box or rack, checking every ball joint or tie-rod end for any free play or knocking. Don't forget to grease any serviceable joint every service and before any big trip.

BRAKES

It's not uncommon for sticks to spear up under the vehicle off-road, and often, it's your brake lines that are in the way. Ensure you have extended brake lines fitted to suit your suspension lift, and check that they are not cracked, swollen or leaking, and that no rocks are jammed in between the hard lines and the chassis.

Brad Green

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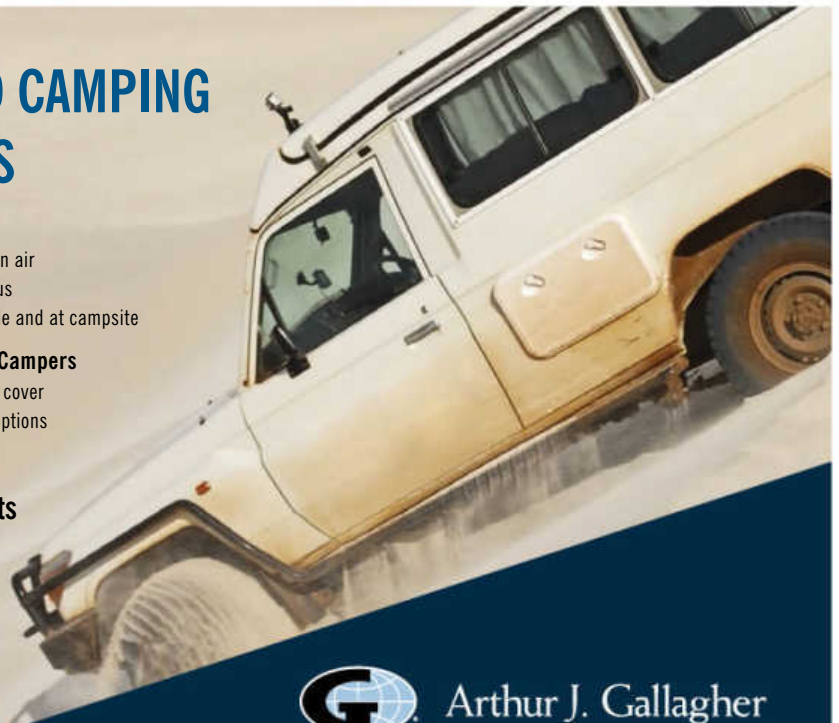
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MORE GET UP AND GO!

Looking for a massive power and torque increase without voiding your factory warranty?
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How does a 40% power increase in a single day sound? From Genie Performance Exhausts comes the Legendex PCM or PowerCommand Module that, when combined with a Legendex exhaust, unleashes the true power of your 4WD. Dyno reports have seen incredible rises by as much as 40% over factory specs. That's almost like gaining a whole other set of cylinders!

The Power Command Module works by assisting your diesel's ECU to regulate the length of time it injects fuel into the cylinder, essentially giving you more bang when the piston compresses the air and fuel. The Legendex PCM increases power extremely safely – it keeps common rail pressures and engine temperatures

from creeping unnecessarily high by making hundreds of complex calculations with the factory ECU – all within the factory ECU parameters – something that's critical in extending the life of your engine.

Genie are so confident that their PCM gives you safe power gains that they'll offer you a five year warranty, and guarantee that fitting the chip will not void your factory warranty. And when it comes to installation, it couldn't be easier, taking about five minutes to plug in to your ECU and secure it within the engine bay. Best of all this whole process is completely DIY – you can even dial in the amount of power to best play with the ratio between fuel economy and power gains.



PROVEN DYNO RESULTS

This 3.0L Nissan Patrol saw huge gains in power and torque after fitting a PCM and Legendex exhaust combo. A massive increase of 43% horsepower at 70-100km/h.

VEHICLE	HP BEFORE (70-100km/h)	HP AFTER (70-100km/h)	MAX % HP INCREASE
2011 Nissan Patrol 3L TD	75-92HP	101-132HP	43% at 85km/h

3 MORE REASONS TO CHOOSE LEGENDEX

1 COOLER RUNNING TEMPS

With an aftermarket Legendex exhaust fitted, your engine can funnel the hot exhaust gas away faster than a stock exhaust, reducing the running temperature of your engine plus the ceramic coating effectively insulates reducing the under-bonnet temps too.

2 INCREASED FUEL ECONOMY

Thanks to the huge lower end power gains from the PCM, you can effectively lower the RPM of your engine whilst keeping the same speed. This means your fuel bill will drop as you've tuned the engine to burn the fuel in a more effective manner. How much fuel you save all comes down to how heavy your right foot is.

3 EXTENDED ENGINE LIFE

Engines that live to old age all have one thing in common – they spend a lot of time without stress. By adding power to your 4WD you can continue your normal driving habits – although this time the engine is not working as hard to maintain or gain speed.

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Here are some of the latest and greatest products from the world of 4WDing. We're always on the lookout for new or exciting 4WD products to write about or review. If you have seen a new product and want us to know about it, contact us at products@overlander.com.au.

NEW GENERATION SOLAR PANELS

From Aussie Batteries & Solar comes the next generation of solar panels that are highly efficient, durable and slim

Adding solar capability to your 4WD not only extends your range – it makes you far more self-reliant if you found yourself with emergency repairs out in the bush. From Aussie Batteries & Solar comes the new generation of solar panels that provide a greater energy output from the sun than compared to older panels. Constructed from Kyocera Japanese solar cells, these mono-crystalline panels

the amount of time you need to leave it out in the sun. A single 65W Kyocera Solar Panel from Aussie Batteries & Solar is ideal for powering devices like LED lights, phone and laptop charges, maintenance chargers and fridges up to 35L in size.

The 65W 12V Portable Solar Panel with Kyocera Japanese Cells retails for \$329. To purchase head to



WHAT THEY FEATURES

- Constructed from Kyocera mono-crystalline solar cells that increase kWh yield whilst improving durability
- Totally pre-wired – simply plug and play
- An IP66 waterproof 10A solar regulator
- Hail-proof construction makes them ideal for roof rack mounting
- Anodised aluminium stands and frame which are rust-proof
- 7m heavy duty cable with Anderson plug
- Carry bag for portable use
- Comes with a 25year warranty that the solar panel will not fall below 80% of the rated power and a 2 year general warranty on the panel and components

HIGH POWERED WORKLAMPS

Exceptionally bright in a compact package, LED Autolamps 12 Watt lamps light the way



Tough, powerful and compact the new 12 Watt Flood Lamp from LED Autolamps is both a bright worklight and an ADR approved reverse light. Ideal for on and off-road use, a specially designed polycarbonate lens and heavy duty die cast alloy base combine to make a rugged and hard-wearing lighting solution. Also featuring IP67 water and dust proof rating and a 5 year warranty you can fit these to your 4WD and tackle the tough stuff without a worry.

WHAT THEY FEATURE

- Compact size – only 73mm x 73mm x 31mm
- ECE/ADR approved as reverse lights
- Four 3 Watt LEDs for a total of 12W with
- Low power use – only 0.68 Amps current draw at 13.8V
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- 660 lumen output
- 6000k white colour light similar to daylight

For more information visit www.ledautolamps.com, or call 03 9466 7075 to find your nearest distributor



NEW COMPACT COMPRESSOR FRIDGE / FREEZER

Compact, lightweight and efficient, the new WAECO CFX-28 is the perfect travel companion for any trip

If you're heading away for the weekend you might not want to throw a huge fridge into your 4WD or trailer, on the other hand if you're packing for remote touring, more fridge space might be exactly what you need. That's why the WAECO CFX-28 is the perfect all-rounder. Use it as a stand-alone fridge or freezer for shorter trips, or make use of its compact size and use it in the 4WD for long trips to conveniently grab beverages or snacks while on the move.

To find your nearest WAECO retailer, or to find out more about the extensive range of WAECO products to suit your on-board and outdoor needs, including portable refrigeration, mobile power and kitchen solutions and automotive accessories, visit www.waeco.com.au or free call 1800 21 21 21.

WHAT IT FEATURES

- Genuine WAECO compressor with integrated AC electronics
- Variable motor speed optimisation Mk2
- 28.2L capacity in a lightweight and compact size - fits 43 cans, or fits 1.25L softdrink or wine bottles upright
- Fridge / Freezer modes with cooling up to 50°C below ambient
- 12 / 24V DC and 240V AC operating modes with USB charging outlet
- 3 stage battery protection
- Optional quick release mounting kit so you can easily move the CFX-28 when you get to camp
- Weight (net): 13.1 kg
- Dimensions: W342 x H425 x D552 mm (D620 including handles)

HEAVY DUTY DRAWER SLIDES

DIY build your own fridge, solar and rear storage slides with Ovesco's ultra-tough drawer slides

If you're setting up your 4WD to be the ultimate touring machine, you'll quickly find that running out of storage space is a common problem. From Ovesco comes their heavy-duty range of OCCO drawer slides that allow you to build storage features that easily slide out when you're at camp. Perfect for DIY building your own set of rear drawers, these Ovesco OCCO drawer slides can be used to create a whole range of space savers like a fridge slide, slide-out solar panel, slide-out kitchen and even a slide-out ladder to access your roof rack. Rated up to 190kg, there's something in the Ovesco drawer slide range for every purpose and every 4WD.

The OCCO Drawer Slides from Ovesco range in price from \$12.95 to \$360 depending on length and weight capacity. To check out the whole range head online to www.ovesco.com.au or phone (02) 4967 1688.



WHAT THEY FEATURE

- Available in both locking and non-locking slides when fully extended
- Constructed from ultra-heavy duty ZP steel to resist corrosion
- Each drawer slide is sold in pairs
- Available in a variety of lengths from 250mm to 1523mm and weight capacities from 15kg to 190kg
- Each slide operates on smooth roller bearings
- Custom track lengths, caps, rollers and slides are available to build an OCCO drawer slide to perfectly suit your 4WD

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BUYER'S GUIDE

MODEL	CCs	CYL.	TRANS	FUEL TANK	L/100KM	KW/Nm	TOWING	KERB WEIGHT	PAY-LOAD	NEW PRICE
FORD RANGER										
										
The new Ranger, with a 2.2L or 3.2L turbo-diesel engine, packs plenty of innovation into a rugged package. The larger engine is the pick, producing 147kW and 470Nm. It has a 3500kg braked towing capacity. The quiet engine and Dynamic Stability Control give the Ranger great on-road manners; and off-road it is excellent. An optional factory rear diff is available on upper-spec models.										
XL 2.2 C/CHAS	2198	DT4	6 M	80	8.1	110/375	750/3500	1762	1436	\$38,390
XL 2.2 CREW C/CHAS	2198	DT4	6 M	80	8.9	110/375	750/3500	1909	1291	\$42,890
XL 2.2 CREW C/CHAS	2198	DT4	6 A	80	9.2	110/375	750/3500	1909	1291	\$44,890
XL 2.2 CREW CAB UTE	2198	DT4	6 M	80	8.1	110/375	750/3500	2034	1166	\$43,890
XL 2.2 CREW CAB UTE	2198	DT4	6 A	80	9.4	110/375	750/3500	2034	1166	\$45,890
XL 3.2 C/CHAS	3198	DT5	6 M	80	8.9	147/470	750/3500	1795	1405	\$40,890
XL 3.2 C/CHAS	3198	DT5	6 A	80	9.2	147/470	750/3500	1795	1405	\$42,890
XL 3.2 SUPER C/CHAS	3198	DT5	6 M	80	8.9	147/470	750/3500	1870	1330	\$43,390
XL 3.2 SUPER CAB UTE	3198	DT5	6 M	80	8.9	147/470	750/3500	2018	1182	\$44,390
XL 3.2 DUAL CAB UTE	3198	DT5	6 M	80	8.9	147/470	750/3500	2068	1132	\$46,390
XL 3.2 DUAL CAB UTE	3198	DT5	6 A	80	9.2	147/470	750/3500	2068	1132	\$48,390
XL 3.2 SUPER CAB UTE	3198	DT5	6 M	80	8.9	147/470	750/3500	2095	1105	\$50,890
XL 3.2 SUPER CAB UTE	3198	DT5	6 A	80	9.2	147/470	750/3500	2095	1105	\$52,890
XL 3.2 DUAL CAB UTE	3198	DT5	6 M	80	9.4	147/470	750/3500	2159	1041	\$53,390
XL 3.2 DUAL CAB UTE	3198	DT5	6 A	80	9.2	147/470	750/3500	2159	1041	\$55,390
WILDTRACK 3.2 DUAL CAB UTE	3198	DT5	6 M	80	9.4	147/470	750/3500	2200	1000	\$57,390
WILDTRACK 3.2 DUAL CAB UTE	3198	DT5	6 A	80	9.6	147/470	750/3500	2200	1000	\$59,390


GREAT WALL V-SERIES

										
Great Wall's dual-cab V200 and V240 are available in dual cab or single-cab/chassis configuration. The V200 has the 2.0L turbo-diesel; the V240 has a 2.4L petrol.										
V240 C/CHAS	2378	4	5 M	70	10.7	100/200	750/1900	1507	1320	\$20,990
V240 DUAL CAB UTE	2378	4	5 M	70	10.7	100/200	750/2250	1780	1000	\$25,990
V200 C/CHAS	1996	DT4	6 M	70	8.3	105/310	700/1700	1707	1180	\$22,990
V200 DUAL CAB	1996	DT4	6 M	70	8.3	105/310	750/2000	1835	1000	\$27,990


GREAT WALL X-SERIES


										
Based on the V200/V240 platform, the X200 and X240 are the cheapest dual-range-equipped 4WD wagons on the market. The X-Series have the same engines as the V-Series. This is a well-equipped vehicle for the price.										
X240 4D WAGON	2378	4	5 M	-	10.4	100/200	-	1830	475	\$23,990
X200 4D WAGON	1996	DT4	6 M	70	8	105/310	700/1700	1890	660	\$26,990
X200 4D WAGON	1996	DT4	5 A	70	9.2	105/310	700/1700	1890	660	\$28,990

HOLDEN COLORADO

										
The 4WD Colorado is available in six variants, all powered by a 3.0L four-cylinder turbo-diesel that's a strong performer and offers a good balance of power/torque and economy. Recent upgrades have lifted towing capacity to 3000kg.										
DX C/CHAS	2776	DT4	5 M	76	8.1	132/440	750/3500	1793	1307	\$34,990
LX C/CHAS	2776	DT4	6 A	76	9.1	132/470	750/3500	1798	1302	\$37,990
LX SPACE C/CHAS	2776	DT4	6 A	76	8.1	132/470	750/3500	1907	1190	\$42,490
LX CREW CAB P/U/P	2776	DT4	5 M	76	7.9	132/440	750/3500	2019	1080	\$44,490
LX CREW C/CHAS	2776	DT4	6 A	76	9.1	132/470	750/3500	1910	1090	\$44,990
LX CREW CAB P/U/P	2776	DT4	6 A	76	9.1	132/470	750/3500	2019	1090	\$46,490
LT CREW CAB P/U/P	2776	DT4	5 M	76	7.9	132/440	750/3500	2007	1090	\$45,490
LT CREW CAB P/U/P	2776	DT4	6 A	76	9.1	132/470	750/3500	2007	1090	\$47,490
LTZ SPACE CAB P/U/P	2776	DT4	6 A	76	9.1	132/470	750/3500	2034	1066	\$49,490
LTZ CREW CAB P/U/P	2776	DT4	5 M	76	7.9	132/440	750/3500	2056	1040	\$49,990
LTZ CREW CAB P/U/P	2776	DT4	6 A	76	9.1	132/470	750/3500	2056	1040	\$51,990

ISUZU D-MAX


										
The new Isuzu D-MAX has a powerful and fuel-efficient 3.0-litre turbo-diesel and has more safety features as standard - including dual front, side and curtain airbags, Anti-lock Brake System and Electronic Brakeforce Distribution - than ever before. There's also Electronic Stability Control and Traction Control systems, plus Brake Assist. This is a great all-round package.										
EX C/CHAS	2999	DT4	5 M	76	8.3	130/380	750/3500	-	-	\$33,400
LS-M HI-RIDE CREW CAB	2999	DT4	5 M	76	8.3	130/380	750/3500	-	-	\$44,000
LS-M HI-RIDE CREW CAB	2999	DT4	5 A	76	8.1	130/380	750/3500	-	-	\$46,200
SX HI-RIDE CREW CAB	2999	DT4	5 M	76	8.3	130/380	750/3500	-	-	\$42,000
SX HI-RIDE CREW CAB	2999	DT4	5 A	76	8.1	130/380	750/3500	-	-	\$44,200
LS-TERRAIN HI-RIDE CREW	2999	DT4	5 M	76	8.3	130/380	750/3500	-	-	\$49,500
LS-TERRAIN HI-RIDE CREW	2999	DT4	4 A	76	8.1	130/380	750/3500	-	-	\$51,700
LS-U HI-RIDE SPACE CAB	2999	DT4	5 M	76	8.3	130/380	750/3500	-	-	\$43,700
LS-U HI-RIDE SPACE CAB	2999	DT4	5 A	76	8.1	130/380	750/3500	-	-	\$45,900
LS-U HI-RIDE CREW CAB	2999	DT4	5 M	76	8.3	130/380	750/3500	-	-	\$45,500
LS-U HI-RIDE CREW CAB	2999	DT4	5 A	76	8.1	130/380	750/3500	-	-	\$47,700
SX C/CHAS	2999	DT4	5 M	76	8.3	130/380	750/3500	-	-	\$36,490
SX C/CHAS	2999	DT4	5 A	76	8.1	130/380	750/3500	-	-	\$38,600
SX SPACE C/CHAS	2999	DT4	5 M	76	8.3	130/380	750/3500	-	-	\$39,100
SX SPACE C/CHAS	2999	DT4	5 A	76	8.1	130/380	750/3500	-	-	\$41,300
SX CREW C/CHAS	2999	DT4	5 M	76	8.3	130/380	750/3500	-	-	\$43,100
SX CREW C/CHAS	2999	DT4	5 A	76	8.1	130/380	750/3500	-	-	\$45,500

MODEL	CCs	CYL.	TRANS	FUEL TANK	L/100KM	KW/Nm	TOWING	KERB WEIGHT	PAY-LOAD	NEW PRICE
ISUZU MU-X										
										
The MU-X is Isuzu's first offer in the 4WD wagon market and follows on from the success of the D-MAX. With three models and two transmissions and a 3.0L turbo-diesel engine on offer, the MU-X is a surprisingly off-road capable, but family-friendly touring option.										
LS-M	2999	DT4	5 A	65	8.4	130/380	750/3000	2000	750	\$47,800
LS-M	2999	DT4	5 M	65	8.4	130/380	750/3000	2000	750	\$45,600
LS-T	2999	DT4	5 A	65	8.4	130/380	750/3000	2060	690	\$53,500
LS-U	2999	DT4	5 A	65	8.4	130/380	750/3000	2040	710	\$49,300
LS-U	2999	DT4	5 M	65	8.4	130/380	750/3000	2040	710	\$47,100


JEEP CHEROKEE

										
Four variants, three off-road systems and two engines mean there's a Cherokee for every purpose - even some pretty serious off-roading. The Jeep Cherokee has raised the bar when it comes to transmissions by equipping the entire model range with a first-in-segment nine-speed automatic as standard.										
LONGITUDE	3239	V6	9 A	60	10.0	200/316	470/2200	1795	-	\$39,000
LIMITED	3239	V6	9 A	60	10.0	259/520	450/2200	1806	-	\$44,000
TRAILHAWK	3239	V6	9 A	60	10.0	200/316	2450/2200	1936	-	\$47,500

JEEP GRAND CHEROKEE

										
New Grand Cherokee is a significant departure from previous models as it has a fully independent suspensions system. Available with a 3.0L turbo-diesel V6, 3.6L petrol V6 and 5.7L petrol V8. The SRT 8 has a monster 6.4L petrol V8 with a price tag to match.										
JET	3604	V6	5 A	93.5	11	210/347	750/2268	2191	760	\$46,500
LAREDO	2987	DTV6	5 A	93.5	8.3	177/550	750/2268	2191	760	\$50,000
LAREDO	3604	V6	5 A	93.5	11	210/347	750/2268	2191	760	\$45,000
LIMITED	2987	DTV6	5 A	93.5	8.3	177/550	750/2268	2191	760	\$60,000
LIMITED	3604	V6	5 A	93.5	11	210/347	750/2268	2191	760	\$55,000
LIMITED	5654	V8	5 A	93.5	14.1	259/520	750/3500	2191	760	\$60,000
OVERLAND	2987	DTV6	5 A	93.5	8.3	177/550	750/3500	2307	660	\$69,500
OVERLAND	3604	V6	5 A	93.5	11	210/347	750/2250	2280	660	\$65,000
OVERLAND	5654	V8	5 A	93.5	14.1	259/520	750/3500	2307	660	\$69,500
SRT 8	6424	V8	5 A	91	14.1	344/624	750/2268	2336	612	\$76,000
SRT 8 ALPINE	6424	V8	5 A	91	14.1	344/624	750/2268	2336	612	\$81,900
SRT 8 VAPOUR	6424	V8	5 A	91	14.1	344/624	750/2268	2336	612	\$81,900

JEEP WRANGLER 2 DOOR




The Wrangler was updated with the addition of a 3.6L V6 petrol producing 209kW. This is matched to a 6-speed manual or 5-speed auto. The 2.8L turbo-diesel is still available, with torque boosted to 460Nm. An off-road pack is available on petrol and diesel Sport models.

	3604	V6	6 M	70	11.4	209/347	750/1600	1855	365	\$32,500
SPORT S/TOP	3604	V6	5A	70	11.6	209/347	750/1600	1855	365	\$34,500
SPORT S/TOP	2776	DT4	5A	66	8.6	147/460	750/1600	1975	-	\$39,500
SPORT S/TOP	2776	DT4	6M	66	8	147/460	750/1600	1975	-	\$38,500
RENEGADE SPORT H/TOP	3778	V6	6 M	70	10.4	146/315	750/1600	1855	-	\$35,000
RENEGADE SPORT H/TOP	3778	V6	5A	70	11.6	146/315	750/1600	1855	-	\$37,000
RENEGADE SPORT H/TOP	2776	DT4	5A	66	8.1	147/460	750/1600	1975	-	\$42,000
RENEGADE SPORT H/TOP	2776	DT4	6M	66	8	147/460	750/1600	1975	-	\$41,000
RUBICON S/TOP	3604	V6	6 M	70	11.4	209/347	750/1600	1885	365	\$43,000
RUBICON S/TOP	3604	V6	5A	70	11.6	209/347	750/1600	1885	365	\$45,000

MODEL	CCs	CYL.	TRANS	FUEL TANK	L/100KM	Kw/Nm	TOWING	KERB WEIGHT	PAY-LOAD	NEW PRICE
LAND ROVER DEFENDER										
	The Defender is very capable off-road, and surprisingly good on-road thanks to its frugal and adequately powerful turbo-diesel engine but it still feels and drives like a truck. Recently expanded range offers nine models on three different wheelbases. A 2.2L turbo-diesel joined the 2.4L in 2012.									
90	2179	DT4	6M	60	10	90/360	750/3500	1815	935	\$44,990
110 2D HARDTOP	2179	DT4	6M	75	11	90/360	750/3500	2014	1010	\$46,690
110 CREW CAB P/UP	2179	DT4	6M	75	11	90/360	750/3000	1940	1110	\$49,690
110 HCPU P/UP	2179	DT4	6M	75	11.1	90/360	750/3000	1660	1410	\$48,190
110 4D WAGON	2179	DT4	6M	75	11	90/360	750/3500	2014	1010	\$49,690
130 C/CHAS	2179	DT4	6M	75	11	90/360	750/3500	2120	1380	\$48,690
130 CREW C/CHAS	2179	DT4	6M	75	11	90/360	750/3500	2120	1380	\$52,690
130 HCPU CREW CAB P/UP	2179	DT4	6M	75	11	90/360	750/3500	2120	1380	\$54,190


MAHINDRA PIK-UP

	The Pik-Up is a relatively modern design that performs well and appears to be well built. The four-model Pik-Up range (ute or cab-chassis with single or double cabs) all have turbo-diesel power and part-time, dual-range 4WD. Lots of metal for your money. *Prices are drive-away.									
C/CHAS	2179	DT4	5M	80	9.1	85/270	750/2500	2090	1060	\$26,499
2D UTE	2179	DT4	5M	80	9.1	85/270	750/2500	2090	1060	\$27,499
DOUBLE C/CHAS	2179	DT4	5M	80	9.1	85/270	750/2500	2150	1000	\$29,999
DUAL CAB UTE	2179	DT4	5M	80	9.1	85/270	750/2500	2150	1000	\$30,499


MAZDA BT50


	The new BT-50 rattled the dual-cab cage with a powerful 3.2L turbo-diesel engine and car-like refinement. The exterior styling has divided the 4WD community but this Mazda's rugged off-road ability, 3.35 tonne towing capacity, and 8.9L/100km fuel consumption make it a worthy candidate for a great work and play ute. Styling aside, it's almost identical to the Ranger, only more affordable.									
XT C/CHAS	3196	DT5	6M	80	8.9	147/470	750/3500	1789	1411	\$36,810
XT FREESTYLE C/CHAS	3196	DT5	6M	80	8.9	147/470	750/3500	1857	1343	\$40,740
XT DUAL C/CHAS	3196	DT5	6M	80	8.9	147/470	750/3500	1929	1271	\$42,740
XT DUAL CAB UTE	3196	DT5	6M	80	8.9	147/470	750/3500	2044	1156	\$44,240
XT DUAL CAB UTE	3196	DT5	6A	80	9.2	147/470	750/3500	2044	1156	\$46,240
XTR FREESTYLE UTE	3196	DT5	6M	80	8.9	147/470	750/3500	2037	1163	\$46,890
XTR DUAL CAB UTE	3196	DT5	6M	80	8.9	147/470	750/3500	2086	1114	\$48,890
XTR DUAL CAB UTE	3196	DT5	6A	80	9.2	147/470	750/3500	2086	1114	\$50,890
GT DUAL CAB UTE	3196	DT5	6M	80	8.9	147/470	750/3500	2095	1105	\$51,140
GT DUAL CAB UTE	3196	DT5	6A	80	9.2	147/470	750/3500	2095	1105	\$53,140

MERCEDES-BENZ G


	The Mercedes Benz G-Class or G-Wagen remains stylistically similar to versions that rolled off the production line in 1979. Current-spec G-Wagen is available to Australians, with a 3.0-litre turbo-diesel V6 and a supercharged 5.4 litre petrol V8.									
350	2987	DTV6	7A	96	11.2	155/540	-	2458	700	\$161,180
55 AMG	5439	SV8	5A	96	15.9	373/700	-	2471	620	\$216,730

MITSUBISHI CHALLENGER


	New-gen Challenger is based on the MN model Triton but has a coil-sprung rear live-axle instead of a leaf-sprung rear axle. All models have the same 2.5L four-cylinder turbo-diesel but only the base model has a five-speed manual. Other models have the five-speed auto as offered in top-spec Triton. All models get Mitsubishi's Super Select 4WD system and electronic traction and stability control. A seven-seat option is available for the base LS. Towing capacity is 3000kg.									
CHALLENGER 30th ANNIV.	2477	DT4	5M	70	8.3	131/400	750/2500	2051	640	\$41,490
CHALLENGER 30th ANNIV.	2477	DT4	5A	70	9.8	131/350	750/2500	2051	640	\$43,990
CHALLENGER	2477	DT4	5M	70	8.3	131/400	750/2500	2019	691	\$41,490
CHALLENGER	2477	DT4	5A	70	9.8	131/400	750/2500	2029	681	\$43,990
LS (5 SEAT)	2477	DT4	5M	70	8.3	131/400	750/3000	2041	669	\$45,490
LS (5 SEAT)	2477	DT4	5A	70	9.8	131/350	750/3000	2051	659	\$47,990
LS (7 SEAT)	2477	DT4	5A	70	9.8	131/350	750/3000	2106	609	\$49,890
XLS (5 SEAT)	2477	DT4	5A	70	9.8	131/350	750/3000	2059	651	\$55,290
XLS (7 SEAT)	2477	DT4	5A	70	9.8	131/350	750/3000	2110	606	\$57,190

MODEL	CCs	CYL.	TRANS	FUEL TANK	L/100KM	Kw/Nm	TOWING	KERB WEIGHT	PAY-LOAD	NEW PRICE
MITSUBISHI PAJERO										
	The NW Pajero is still the only serious Japanese 4WD to use fully independent suspension and monocoque construction. It has class-leading on-road dynamics and excels in the bush. Excluding the Exceed 3.6L V6, petrol engines have been dropped from the range in favour of the updated 3.2L turbo-diesel: 147kW and 441Nm. A minor facelift and improved safety features are the only other main features of the new NW.									
EXCEED LWB	3200	DT4	5A	88	9	147/441	750/3000	2347	683	\$73,990
EXCEED LWB	3828	V6	5A	88	13.5	184/329	750/3000	2250	670	\$71,490
GLX-R LWB	3200	DT4	5A	88	9	147/441	750/3000	2314	716	\$58,990
GLX-R LWB	3200	DT4	5M	88	8.4	147/441	750/3000	2324	706	\$55,990
VR-X LWB	3200	DT4	5A	88	9	147/441	750/3000	2325	706	\$63,990
VR-X LWB	3200	DT4	5M	88	9	147/441	750/3000	2325	706	\$60,990
GLX LWB	3200	DT4	5A	88	9	147/441	750/3000	2273	750	\$53,990
GKX LWB	3200	DT4	5M	88	8.4	147/441	750/3000	2283	740	\$50,990


MITSUBISHI TRITON

	The Triton has a 2.5L turbo-diesel with more power and torque than the outgoing 3.2L diesel. While a five-speed manual is standard, a four-speed auto (+\$2000) is optional on GLX and GL-R double cabs; the GLX-R gets an optional (+\$3000) five-speed auto. The GLX-R also gets Super-Select 4WD; other models have part-time 4WD. Side airbags, and electronic traction and stability control are available.									
GLX C/CHAS	2477	DT4	5M	75	9.1	131/400	750/3000	1810	1120	\$33,990
GLX CLUB CAB UTE	2477	DT4	5M	75	8.1	131/400	750/2700	1873	1057	\$38,240
GLX DOUBLE CAB UTE	2477	DT4	5M	75	9.1	131/400	750/3000	1905	1025	\$40,990
GLX DOUBLE CAB UTE	2477	DT4	4A	75	9.9	131/350	750/3000	1905	1025	\$42,990
GL-R DOUBLE CAB UTE	2477	DT4	5M	75	9.1	131/400	750/3000	1920	1010	\$43,990
GL-R DOUBLE CAB UTE	2477	DT4	4A	75	9.9	131/350	750/3000	1920	1010	\$45,990
GLX-R DOUBLE CAB UTE	2477	DT4	5M	75	9.1	131/400	750/3000	1920	1010	\$45,740
GLX-R DOUBLE CAB UTE	2477	DT4	5A	75	9.9	131/350	750/3000	1920	1010	\$48,240


NISSAN PATHFINDER

	The R52 Pathfinder moves even further away from a genuinely capable 4WD than it's fully independent predecessor did. It's a clear step towards modernity in design, and offers a more car-like performance and amenity.									
ST (4x4)	3498	V6	CVT	73	10.2	190/325	750/2700	1985	730	\$44,490
ST-L (4x4)	3498	V6	CVT	73	9.9	190/325	750/2700	2025	690	\$54,490
Ti (4x4)	3498	V6	CVT	73	9.9	190/325	750/2700	2065	650	\$65,090

NISSAN PATROL Y61

	Despite facelifts and dropping all engines bar the 3.0L common-rail turbo-diesel the Nissan Patrol GU remains largely the same vehicle since 1997. The Patrol's chassis is as tough and durable as they come and formidable off road but the engine is not state of the art.									
ST COIL C/CHAS	2953	DT4	5M	175	12.5	118/380	750/3200	2009	1140	\$55,050
ST 4DR WAGON	2953	DT4	5M	125	10.9	118/380	750/3200	2450	580	\$57,390
ST 4DR WAGON	2953	DT4	4A	125	11.8	118/354	750/2500	2450	580	\$60,390
DX 4DR WAGON	2953	DT4	5M	125	10.9	118/380	750/3200	2360	670	\$53,890
DX 4DR WAGON	2953	DT4	4A	125	11.8	118/354	750/3200	2360	650	\$56,890

NISSAN PATROL Y62

	Launched in late 2012 the Y62 Patrol is the Nissan's latest generation 4WD. With independent suspension and a plethora of high-tech driving aids it performs well. However, the decision to only launch a petrol engine in Australia has hurt long-term sales. Fans eagerly await a hinted-at diesel variant.									
Ti 4DR WAGON	5552	V8	7A	140	14.5	298/560	750/3500	2800	700	\$92,850
Ti-L 4DR WAGON	5552	V8	7A	140	14.5	298/560	750/3500	2829	670	\$113,900
ST 4DR WAGON	5552	V8	7A	140	14.5	298/560	750/3500	2739	760	\$82,200




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BUYER'S GUIDE

MODEL	CCs	CYL.	TRANS	FUEL TANK	L/100KM	Kw/Nm	TOWING	KERB WEIGHT	PAY-LOAD	NEW PRICE
NISSAN NAVARA										
	With the release of the all new NP300 Navara, Nissan still offer three generations of Navara side by side for the time being, although the D22 is being run out, and the D40 is assumed to be not far behind. The new NP300 offers a 2.3L turbo diesel engine with improved power and torque figures as well as vastly superior fuel economy. The option of a six speed manual or seven speed auto is also a big improvement. The improvements don't stop there, however, as the brake towing capacity has been increased to 3500kg, making the NP300 a very attractive proposition to any potential dual cab ute owner.									
D22 SERIES 5 DX C/CHAS	2488	DT4	5 M	75	9.1	98/304	750/2800	1723	-	\$33,490
D22 SERIES 5 ST-R DUAL CAB	2488	DT4	5 M	75	9.2	98/304	750/2800	1823	-	\$33,990
D40 RX C/CHAS	2488	DT4	6 M	80	9.3	106/356	750/3000	1630	1230	\$35,190
D40 RX KING C/CHAS	2488	DT4	6 M	80	9.8	126/403	750/3000	1751	1110	\$40,290
D40 RX KING C/CHAS	2488	DT4	5 A	80	10.5	126/403	750/3000	1751	1110	\$42,590
D40 ST-X KING C/CHAS	2488	DT4	6 M	80	9.8	126/406	750/3000	1769	1090	\$42,450
D40 ST-X KING DUAL CAB	2488	DT4	6 M	80	9.8	126/403	750/3000	1921	940	\$43,790
D40 ST-X KING C/CHAS	2488	DT4	5 A	80	10.5	126/403	750/3000	1769	1090	\$46,060
D40 ST-X KING DUAL CAB	2488	DT4	5 A	80	10.5	126/403	750/3000	1921	940	\$47,790
NP300 RX	2298	DT4	6 M	80	6.6	120/403	750/3500	1823	1087	\$39,900
NP300 RX	2298	DT4	7 A	80	7.1	120/403	750/3500	1823	1087	\$42,490
NP300 ST	2298	DT4	6 M	80	6.5	140/450	750/3500	1865	-	\$45,890
NP300 ST	2298	DT4	7 A	80	7	140/450	750/3500	1865	-	\$48,490
NP300 ST-X	2298	DT4	6 M	80	6.5	140/450	750/3500	1921	-	\$51,990
NP300 ST-X	2298	DT4	7 A	80	7	140/450	750/3500	1921	-	\$54,490


RANGE ROVER SPORT

	Based on the Discovery 4, the Range Rover Sport is available with several engine options including the 3.0L turbo-diesel V6, as well as a 5.0L petrol V8, with a supercharged variant. Offering unparalleled road handling, as well as being very capable off-road thanks to Land Rover's Terrain Response System, the Sport offers the best of both worlds in one package.									
3.0 TDV6 SE	2993	DTV6	8 A	80	7.3	190/600	750/3500	2052	900	\$100,400
3.0 SDV6 SE	2993	DTV6	8 A	80	7.5	190/600	750/3500	2052	900	\$111,200
3.0 SDV6 HSE	2993	DTV6	8 A	80	7.5	215/600	750/3500	2052	900	\$123,400
3.0 V6 SC HSE	2995	SV6	8 A	105	11.3	250/450	750/3500	2059	900	\$122,700
3.0 SDV6 AUTOBIOGRAPHY	2993	DTV6	8 A	80	7.5	215/600	750/3500	2052	900	\$140,600
5.0 V8 SC HSE	4999	SV8	8 A	105	13.8	375/625	750/3500	2265	900	\$161,200


RANGE ROVER VOGUE

	The Range Rover Vogue has the new 4.4-litre twin-turbo V8 diesel that claims 230kW but, more impressively, a massive 700Nm on tap from as low as 1500rpm and doesn't abate until 3000rpm. This new engine is mated to the same eight-speed ZF gearbox as in the 2010 update of the BMW X5. The two petrol V8s, one with a supercharger, are carried over unchanged and are still mated to the 6-speed ZF box.									
5.0 V8	5000	V8	6 A	105	14	276/510	750/3500	2615	490	\$158,100
TdV8	4367	DTV8	8 A	105	9.4	230/700	750/3500	2710	490	\$160,500
5.0 V8 SILVER	5000	V8	6 A	105	14	276/510	750/3500	2615	490	\$161,400
5.0 V8 BLACK	5000	V8	6 A	105	14	276/510	750/3500	2615	490	\$163,300
TdV8 SILVER	4367	DTV8	8 A	105	9.4	230/700	750/3500	2710	490	\$163,800
TdV8 BLACK	4367	DTV8	8 A	105	9.4	230/700	750/3500	2710	490	\$165,700
LUXURY TDV8	4367	DTV8	8 A	105	9.4	230/700	750/3500	2710	490	\$184,200
LUXURY V8 SC	5000	SV8	6 A	105	14.9	375/625	750/3500	2710	490	\$202,100
AUTOBIOGRAPHY TDV8	4367	DTV8	8 A	105	9.4	230/700	750/3500	2710	490	\$214,300
AUTOBIOGRAPHY SC 5.0 V8	5000	SV8	6 A	105	14.9	375/625	750/3500	2710	433	\$231,800
ULTIMATE SC 5.0	5000	SV8	6 A	105	14.9	375/625	750/3500	2710	433	\$318,000
ULTIMATE TDV8	4367	DTV8	8 A	105	9.4	230/700	750/3500	2710	490	\$300,000

SSANGYONG ACTYON


	Actyon comes as a five-door SUV and a dual-cab ute. Both are built on a separate chassis and feature dual-range gearing, all of which sets the Actyon apart from the crowd. There are also 2WD versions of the ute in Tradie and Sports spec. Base-spec Tradie ute is a cost-effective alternative to mainstream Japanese utes. Optional auto (six-speed on ute, four-speed on SUV) adds \$3000.									
A200 XDi	1998	DT4	5 M	75	7.8	104/310	750/2300	1903	620	\$26,990
A200 XDi	1998	DT4	4 A	75	8.5	104/310	750/2300	1903	620	\$29,990
A200 SPR XDi	1998	DT4	4 A	75	8.5	104/310	750/2300	1903	620	\$34,990
SPORTS TRADIE DOUBLE CAB UTE	1998	DT4	M	75	7.4	104/310	750/2300	1912	830	\$28,282
SPORTS TRADIE DOUBLE CAB UTE	1998	DT4	6 A	75	7.9	104/310	750/2300	1912	830	\$30,782
SPORTS DOUBLE CAB UTE	1998	DT4	6 M	75	7.4	104/310	750/2300	1912	830	\$32,282
SPORTS DOUBLE CAB UTE	1998	DT4	6 A	75	7.9	104/310	750/2300	1912	830	\$34,872
SPORTS SPR DOUBLE CAB UTE	1998	DT4	6 A	75	7.9	104/310	750/2300	1963	830	\$37,742

SUZUKI JIMNY


	The Jimny is the latest in the long line of Suzuki's Tonka-tough midgets and combines live-axle coil-spring suspension, separate chassis and dual-range gearing to offer solid off-road ability. Small size and tiny turning circle make it great in town, but a harsh ride, small 1.3L engine and low gearing make highway work tiresome. But it's very handy off road and a great first off-roader.									
SIERRA 2D	1328	4	5 M	60	7.3	60/110	350/1300	1045	375	\$20,490
SIERRA 2D	1328	4	4 A	60	7.8	60/110	350/1300	1050	370	\$22,490

MODEL	CCs	CYL.	TRANS	FUEL TANK	L/100KM	Kw/Nm	TOWING	KERB WEIGHT	PAY-LOAD	NEW PRICE
SUZUKI GRAND VITARA										
	The Grand Vitara is available in three- and five-door variants with three different engines, new four and six-cylinder petrols and a four-cylinder turbo-diesel. The new petrols are a welcome addition as the original ones were sub-standard. The five-door model comes with the choice of all three engines; the manual-only diesel is the pick of the bunch. All Grand Vitara models have traction and stability control as standard. This is the class standard-setter.									
2D	2393	4	5 M	55	8.8	122/225	550/1600	1459	410	\$24,990
2D	2393	4	4 A	55	9.6	122/225	550/1600	1459	410	\$26,990
4D	2393	4	5 M	66	8.9	122/225	750/1850	1567	530	\$28,990
4D	2393	4	4 A	66	9.9	122/225	750/1850	1567	530	\$30,990
4D	1870	DT4	5 M	66	6.8	95/300	750/2000	1630	540	\$35,990
SPORTS 4D	2393	4	5 M	66	8.9	122/225	750/1850	1567	530	\$31,490
SPORTS 4D	2393	4	4 A	66	9.9	122/225	750/1850	1567	530	\$33,490
PRESTIGE 4D	2393	4	4 A	66	9.9	122/225	750/1850	1567	530	\$38,990


TOYOTA FJ CRUISER

	Australia received the FJ Cruiser five years later than the US, but since its launch it has proved a brilliant performer off-road. The 200kW 4.0L petrol V6 and low kerb-weight (2000kg) gives it a great power-to-weight ratio, while the factory rear diff-lock and driver aids help maintain progress in the rough. The lack of a diesel variant or manual box will disappoint some, and the retro styling has polarised 4WDers.									
FJ CRUISER	3956	V6	5 A	159	11.4	200/380	750/2250	1955	555	\$46,490


TOYOTA LANDCRUISER PRADO

	The new Prado 150 Series is slightly bigger, heavier and more aerodynamic than the 120 Series but carries over the D-4D diesel engine and five-speed auto and six-speed manual gearboxes, largely unchanged. The petrol V6 does get a power boost over the 120 thanks to variable timing on the inlet and exhaust cams. All five-door models now seat seven. Two three-door models (auto diesel only) offer a 3000kg tow rating as against the five-doors' 2500kg rating. Auto gearbox on lower-spec models adds \$2500.									
SX 2D WAGON	2982	DT4	5 ASEQ	87	8.3	127/410	750/3000	2095	505	\$56,090
ZR 2D WAGON	2982	DT4	5 ASEQ	87	8.3	127/410	750/3000	2145	455	\$67,490
ALTITUDE	3956	V6	5 ASEQ	150	11.5	202/381	750/2500	2250	650	\$68,490
ALTITUDE	2982	DT4	5 ASEQ	150	8.5	127/410	750/2500	2330	660	\$69,490
GXL	3956	V6	6 M	150	13	202/381	750/2500	2250	650	\$60,490
GXL	3956	V6	5 ASEQ	150	11.5	202/381	750/2500	2250	650	\$62,990
GXL	2982	FT4	6 M	150	8.8	127/410	750/2500	2330	660	\$61,490
GXL	2982	DT4	5 ASEQ	150	8.5	127/410	750/2500	2330	660	\$63,990
KAKADU	3956	V6	5 ASEQ	150	11.5	202/381	750/2500	2355	545	\$90,490
KAKADU	2982	DT4	5 ASEQ	150	8.5	127/410	750/2500	2435	555	\$91,490
VX	3956	V6	5 ASEQ	150	11.5	202/381	750/2500	2345	555	\$76,990
VX	2982	DT4	5 ASEQ	150	8.5	127/410	750/2500	2425	565	\$77,990
GX	2982	DTE	6 M	150	8.8	127/410	750/2500	2210	780	\$55,990
GX	2982	DT4	5 ASEQ	150	8.5	127/410	750/2500	2210	780	\$58,254


TOYOTA LANDCRUISER 200 SERIES


	The 200 Series arrived late in 2007 with an updated 4.7L petrol V8 and an all-new twin-turbo diesel V8, in three spec levels but only as an auto. The D-4D V8 is a great engine but attracts a \$10K premium over the petrol. All models are better equipped than 100 Series with KDSS suspension standard on all but D-4D GXL. The 200 is bigger than the 100 and accommodates up to eight in comfort. The 200 is also safer with up to 10 airbags depending on spec. Being safer, more powerful and better equipped than its predecessors, the 200 is also more costly. More affordable GX standard spec has vinyl floors, barn doors and a factory snorkel. The GXL Altitude was our 2011 4WD Of The Year winner.									
GX	4461	DTV8	6 A	138	10.3	195/650	750/3500	2635	715	\$77,490
GXL	4608	V8	6 A	138	13.6	228/439	750/3500	2635	665	\$83,490
GXL	4461	DTV8	6 A	138	10.3	195/650	750/3500	2700	600	\$88,490
ALTITUDE	4664	V8	5 A	138	14.5	202/410	750/3500	2635	665	\$90,490
VX	4608	V8	6 A	138	13.6	228/439	750/3500	2665	645	\$84,490
VX	4461	DTV8	6 A	93	10.3	195/650	750/3500	2720	580	\$99,490
SAHARA	4608	V8	6 A	138	13.6	228/439	750/3500	2665	645	\$113,490
SAHARA	4461	DTV8	6 A	93	10.3	195/650	750/3500	2720	580	\$118,490


TOYOTA LANDCRUISER 76 SERIES


	Some people call it a four-door Troopie, but Toyota's 76 Series wagon uses the body of what was essentially the original 1985 Prado that was never imported into Australia. Powered by Toyota's new gen (at the time) V8 turbo-diesel, the 76 originally filled a gap in Toyota's model range left by the lack of a Standard model 200 Series. Although aimed at the commercial market, the 76 is a great enthusiast's vehicle. The recent upgrade to driver and passenger airbags is a welcome move.									
WORKMATE 4D WAGON	4461	DTV8	5 M	130	11.9	151/430	750/3500	2220	780	\$59,990
GXL 4DR WAGON	4461	DTV8	5 M	130	11.9	151/430	750/3500	2230	770	\$64,290



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MODEL	CCs	CYL.	TRANS	FUEL TANK	L/100KM	Kw/Nm	TOWING	KERB WEIGHT	PAY-LOAD	NEW PRICE
TOYOTA LANDCRUISER 78 SERIES										
	Like the 79 Series cab-chassis models and the updated 76 Series wagon, the 78 Series Troop Carrier is powered by Toyota's 4.5L V8 turbo-diesel. With 430Nm available from just 1200rpm it makes the gearbox almost redundant. Basic Workmate model comes with three or 11 seats, while GXL has five seats. Factory diff locks make the 78 virtually unstoppable. A great bush tourer, now even better with driver and passenger airbags.									
WORKMATE 3 SEAT TROOPCARRIER	4461	DT/V8	5 M	180	11.9	151/430	750/3500	2320	980	\$65,790
WORKMATE 11 SEAT TROOPCARRIER	4461	DT/V8	5 M	180	11.9	151/430	750/3500	2320	980	\$66,890
GXL TROOPCARRIER	4461	DT/V8	5 M	180	11.9	151/430	750/3500	2335	965	\$67,990

TOYOTA LANDCRUISER 79 SERIES										
	The 'working' LandCruiser has new-gen V8 turbo-diesel power, which will cop service in many Toyotas for years to come; the state of tune will vary within the model range. Recent upgrade has brought a new dashboard with driver and passenger airbags, as well as reach- and height-adjustment on the steering wheel. Optional front and rear diff locks are a great bonus off road.									
WORKMATE C/CHAS	4461	DT/V8	5 M	180	11.5	151/430	750/3500	2045	1250	\$58,790
GX C/CHAS	4461	DT/V8	5 M	180	11.5	151/430	750/3500	2050	1250	\$60,790
GXL C/CHAS	4461	DT/V8	5 M	180	11.5	151/430	750/3500	2065	1235	\$62,790

TOYOTA LANDCRUISER DOUBLE CAB										
	The LC70 Double Cab has the same 4.5L V8 turbo-diesel as in the entire 70 series line-up. With an updated interior, ABS, dual front SRS airbags and 4 wheel discs brakes, in GXL guise it has been a hit in the mining community plus with many off-road enthusiasts. With optional front and rear diff locks, it is be a solid performer in the bush, however, air-con is still only an option.									
WORKMATE DOUBLE C/CHAS	4461	DT/V8	5 M	130	11.9	151/430	750/3500	2205	1100	\$63,990
GXL DOUBLE C/CHAS	4461	DT/V8	5 M	130	11.9	151/430	750/3500	2205	1100	\$67,990








MODEL	CCs	CYL.	TRANS	FUEL TANK	L/100KM	Kw/Nm	TOWING	KERB WEIGHT	PAY-LOAD	NEW PRICE
TOYOTA HILUX										
	With so many 4WD variants on offer it's no wonder that the Hilux is its segment leader and Australia's best-selling 4WD. There are two engines, a 4.0-litre petrol and a 3.0-litre turbo-diesel, three body styles, single cab, extra cab and double cab, two spec levels, and manual and auto gearboxes. The recent update has given the Hilux a redesigned front, improved audio systems and an increased 2.5 tonne towing capacity.									
WORKMATE C/CHAS	2982	DT4	5M	75	8.2	126/343	750/2250	1675	1160	\$31,990
WORKMATE C/CHAS	2982	DT4	4A	75	9.3	126/343	750/2250	1675	1160	\$33,990
WORKMATE DUAL CAB P/UP	2982	DT4	5M	75	8.3	126/343	750/2500	1845	935	\$38,990
WORKMATE DUAL CAB P/UP	2982	DT4	4A	75	9.3	126/343	750/2500	1845	935	\$40,990
SR C/CHAS	2982	DT4	5M	76	8.2	126/343	750/2500	1620	1215	\$34,990
SR C/CHAS	2982	DT4	4A	76	9.3	126/343	750/2500	1620	1215	\$37,490
SR X CAB C/CHAS	2982	DT4	5M	76	8.2	126/343	750/2500	1770	940	\$38,490
SR X CAB P/UP	2982	DT4	5M	75	8.3	126/343	750/2500	1810	900	\$39,990
SR DUAL C/CHAS	2982	DT4	5M	76	8.3	126/343	750/2500	1825	955	\$40,490
SR DUAL CAB P/UP	3956	V6	5M	76	13.1	175/376	750/2500	1765	1045	\$41,990
SR DUAL CAB P/UP	3956	V6	5A	76	13	175/376	750/2500	1765	1045	\$44,490
SR DUAL CAB P/UP	2982	DT4	5M	76	8.3	126/343	750/2500	1815	965	\$41,990
SR DUAL CAB P/UP	2982	DT4	4A	76	9.3	126/343	750/2500	1815	965	\$44,490
SR5 X CAB P/UP	2982	DT4	5M	76	8.3	126/343	750/2500	1830	880	\$46,990
SR5 DUAL CAB P/UP	3956	V6	5M	76	13.1	175/376	750/2500	1770	1040	\$50,990
SR5 DUAL CAB P/UP	3956	V6	5A	76	13	175/376	750/2500	1770	1040	\$53,490
SR5 DUAL CAB P/UP	2982	DT4	5M	76	8.3	126/343	750/2500	1865	915	\$50,990
SR5 DUAL CAB P/UP	2982	DT4	4A	76	9.3	126/343	750/2500	1865	915	\$53,490

VOLKSWAGEN AMAROK										
	European style and build quality from the Volkswagen Amarok brings a refreshing change to the Australian dual-cab market. The 2.0L turbo-diesel produces 120kW and 400Nm, incredible for an engine of its size. The Amarok proved its off-road ability as a main support vehicle in the 2010 Dakar Rally, and with a competitive pricepoint, you'll struggle to find a dual cab that offers such good value.									
TDI400 C/CHAS	1968	DT4	6 M	80	7.8	120/400	750/3000	1865	1175	\$35,490
TDI400 UTILITY	1968	DT4	6 M	80	7.8	120/400	750/3000	1865	1175	\$36,990
TDI400 DUAL CAB	1968	DT4	6 M	80	7.9	120/400	750/3000	1978	1062	\$42,990
TDI400 DUAL C/CHAS	1968	DT4	6 M	80	7.9	120/400	750/3000	1978	1062	\$41,490
TDI420 HIGHLINE D/CAB	1968	DT4	8 A	80	8.3	132/420	750/3000	2080	960	\$53,990
TDI400 HIGHLINE D/CAB	1968	DT4	6 M	80	7.9	120/400	750/3000	2073	960	\$50,990
TDI420 DUAL CAB	1968	DT4	8 A	80	8.3	132/420	750/3000	1985	1055	\$45,990
TDI420 DUAL C/CHAS	1968	DT4	8 A	80	8.3	132/420	750/3000	1985	1055	\$44,490
TDI400 TRENDLINE D/CAB	1968	DT4	6 M	80	7.9	120/400	750/3000	2018	1022	\$45,990
TDI400 TRENDLINE DUAL C/CHAS	1968	DT4	6 M	80	7.9	120/400	750/3000	2018	1022	\$44,490
TDI420 TRENDLINE D/CAB	1968	DT4	8 A	80	8.3	132/420	750/3000	2026	1014	\$48,990
TDI420 TRENDLINE DUAL C/CHAS	1968	DT4	8 A	80	8.3	132/420	750/3000	2026	1014	\$47,490
TDI420 ULTIMATE D/CAB	1968	DT4	8 A	80	8.3	132/420	750/3000	2094	946	\$61,490
TDI400 ULTIMATE D/CAB	1968	DT4	6 M	80	7.9	120/400	750/3000	2087	953	\$58,490
TDI400 ULTIMATE (PERM) D/CAB	1968	DT4	6 M	80	7.9	120/400	750/3000	2087	953	\$58,490

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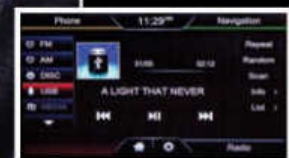
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